SCIENTIFIC AMERICAN

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NEW WAR SHIPS OF THE BRITISH NAVY.

As an example of the latest additions to the Royal Navy, we give an engraving of H.M.S. Imperieuse, for which we are indebted to the *Illustrated London News*. The Imperieuse and her sister ship, the Warspite, are designed as fast cruisers, carrying four heavy revolving guns in barbette towers, and capable of being fired in any direction, besides six lighter guns. Each ship will be able to carry 900 tons of coal, and to steam at the rate of sixteen knots an hour. These ships are brig-rigged, carrying a large spread of canvas for cruising. The dimensions of the ship are: Length, 315 feet; displacement, 7,300 tons; horse power, 8,000.

The Anniston Car Wheel Works.

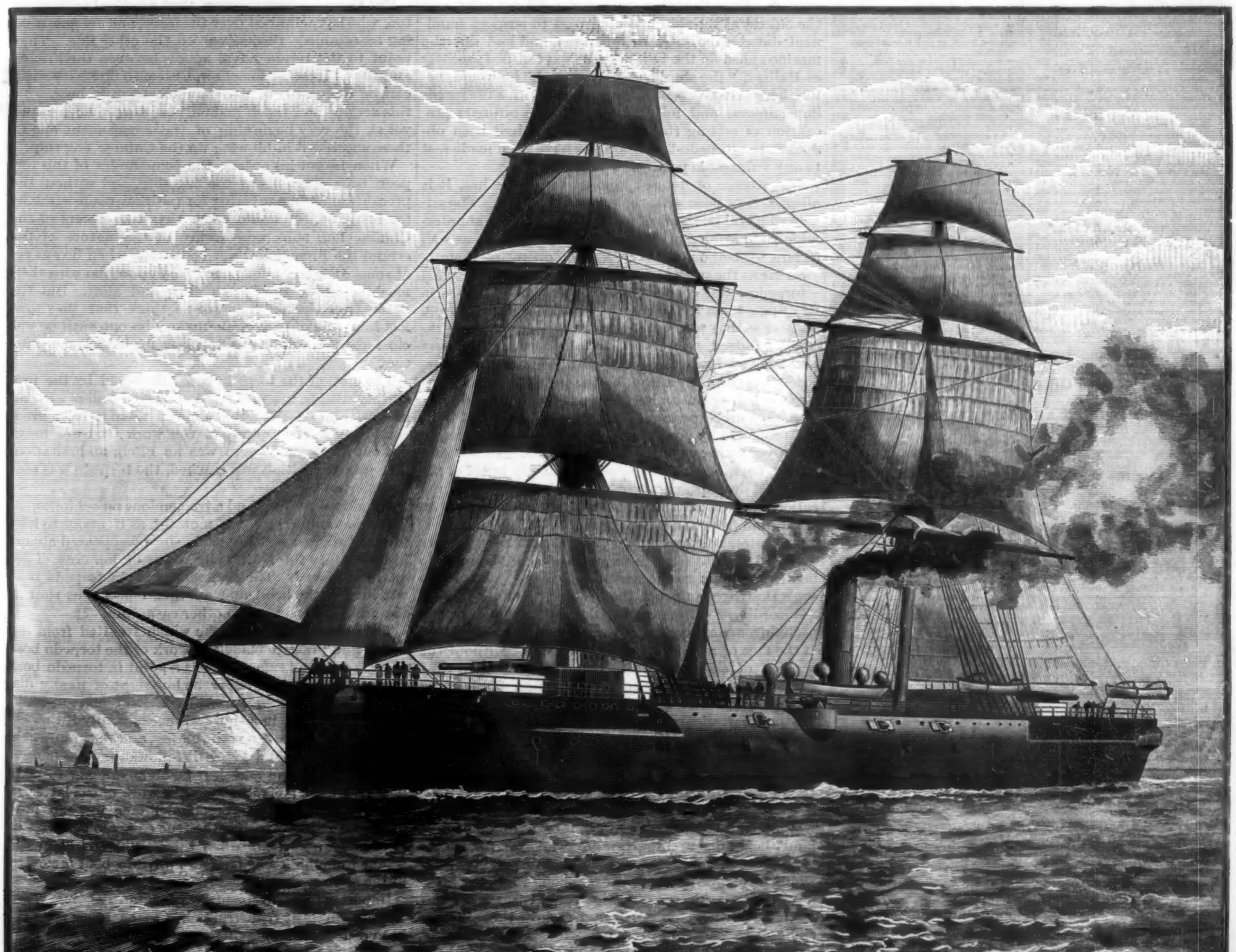
In a recent review of the industries of Anniston, Ala., the Baltimore *Manufacturers' Record* gives the following account of the Anniston Car Wheel Works:

"The Anniston Car Wheel Works are owned by the firm of Noble Brothers and Company. The works comprise a two story brick machine shop, 50 x 150 feet, a foundry 84 x 335 feet, and the forge, 80 x 215 feet. These works are the largest of the kind in the South, and are turning out 200 car wheels per day. The wheels are manufactured of the charcoal iron produced at the Anniston and Clifton furnaces. It is unsurpassed for car wheel purposes; is strong, and of good chilling properties. The wheels are all guaranteed for 50,000 miles, and many of them run 150,000 miles. They are in use by most of the principal railroads in the South. In following up the process of manufacture, the writer first visited the foundry where the iron is melted in a cupola furnace, whose melting capacity is 12 tons an hour, run by a Baker's rotary blower, with one pound pressure driven by a 40 horse power engine. The molten iron runs into a 12 ton reservoir, from which it is taken in ladles to the sand moulds, where the wheels are cast. After this the cores are knocked out, and they go to the annealing pits, where they remain about eight days, and then to the machine shop, are fitted with axles, and are ready for shipment.

The machine shop contains all the latest improved appliances for fitting wheels and axles and building heavy machinery. It is worked by a 90 horse power Corliss beam engine of their own manufacture. The forge, where they roll the iron for the manufacture of axles, is fitted with an 18 inch muck train, a squeezer specially built for axle work, and the largest in the country; shears, two puddling and two heating furnaces, and three steam hammers, the largest of which will strike a 50,000 pound blow or simply crush the shell of a hickory nut. The whole machinery is driven by three engines, varying from 20 to 175 horse power. The car wheel works are constructed on the most improved plan, and everything is moved by hydraulic machinery, driven by hydraulic pumps. The water is forced into an accumulator with a pressure of about 400 pounds to the square inch. Pipes are laid from the accumulator throughout the shops and yards, which is the motive power for all the cranes and elevators. The tracks of the Georgia Pacific, East Tennessee, Virginia & Georgia, and Anniston & Atlantic railroads all run into the car wheel works. The office is elegantly fitted; it contains a large fireproof vault, and is more suggestive of that of a bank in a large city than a factory. Messrs. John and William Noble are the managing partners of the concern. Their car wheels have obtained a reputation second to none in the South, and they are both practical machinists and gentlemen of great business capability."

Manufacture of Oxygen.

MM. Brin, of Passy, are producing oxygen on rather a large scale by the barium oxide process. They have two large retort furnaces regularly going, filled with retorts of 2·80 meters length and 16 centimeters diameter. In these retorts they calcine oxide of barium, passing over it a stream of air which has first passed through quicklime to free it of carbonic acid. During this calcination the heat does not exceed about 500° C., at which temperature the barium oxide absorbs oxygen, becoming peroxidized. The nitrogen is drawn off and passed into gasholders, to be used for making ammonia, etc. When the barium oxide has absorbed as much oxygen as it can, the heat is raised to about 800° C., at which temperature the peroxide is decomposed, giving up again the absorbed oxygen, which is drawn off and pumped into a gasholder. MM. Brin make use of the oxygen so collected in many ways, one being the application of it to the purification of water. Filtered water is placed in a cylinder, and saturated with oxygen gas at 300 pounds pressure to the inch. All organic matter is destroyed, and perfectly pure water results.



THE NEW WAR SHIPS OF THE BRITISH NAVY.—H.M.S. IMPERIEUSE.

Scientific American.

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NEW YORK, SATURDAY, JUNE 6, 1885.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT.

No. 492,

For the Week Ending June 6, 1885.

Price 10 cents. For sale by all newsdealers.

ARE COSTLY SHIPS AND FORTS NECESSARY TO AN EFFECTIVE DEFENSE?

Will any system of torpedo defense suffice to protect our harbors without the aid of powerful iron ships and elaborate land works? If it will, then obviously it were unnecessary that we undertake the construction of a costly fleet and no less costly fortifications. The question is deserving of serious attention just now, because we are practically unarmed, and there is a very evident inclination on the part of Congress to do something for the seaboard. If we must build ships and forts, there is no end of criteria furnished by recent European experience to aid us, and there would seem to have been sufficient experience with torpedoes and torpedo boats to fairly judge of their possibilities; at least, when restricted to the defense of harbors.

Were we surrounded by powerful and hostile neighbors, we should, it is plain, be as ready in attack as defense, and the need of a great fleet and powerful fortifications might reasonably be regarded as imperative. But the fact is, we have no European entanglements, no warlike aspirations, and such is our policy, the most insignificant of the peoples along the Spanish Main have nothing to fear; we want neither their territory nor a hand in the management of their affairs. Whether or no we need ships to show our flag or protect our commerce it is not proposed to discuss here, being aside from the present inquiry. Many persons skilled in the art of war have recorded their convictions in favor of great ships and land-works, with a torpedo service as an auxiliary.

But there are excellent authorities on the other side of the question also, and it is proposed in this article to present the arguments of each without pretending to decide which occupies the more tenable ground, or brings forward the more potent reasons in support of their position.

The first party to this controversy maintain that, so far as we have got, torpedo service, when it relates to the defense of harbors, is only valuable as an auxiliary to a well established system of strong fortifications or floating batteries, or both. To their minds such an exploit as the recent one of affixing a torpedo-bag to the anchor chains of the British war ship Garnet in New York harbor proves nothing, unless it be that there is no limit to which the advertising business may not be carried. Even though a state of war did not exist, and the officers of the ship had no reason to suspect imminent danger, the intruder was seen, and had not the marine guard on the bow been, as was testified recently at Halifax, "the stupidest man aboard," he would, before he was close aboard, have paid with his life for his impertinence and folly. Indeed, if the ordinary precaution of setting the torpedo netting had been observed, the torpedo-bag could not have been made fast to any vulnerable part.

The science of defense against torpedoes has, it is alleged, kept pace with the science of attack. The advanced naval scientist of to-day knows how to countermine and harmlessly explode hostile torpedoes, as well as how to shell out those engaged in operating them.

So far as the system of isolated torpedoes is concerned—torpedoes not connected with the shore—those who rely upon them for defense have as little security from disaster as they who build their houses upon the quicksands. Indeed, even the electrical torpedo, which may be exploded from the shore with certainty and precision, cannot, they affirm, be looked upon as an effective weapon against a hostile fleet of modern construction, save under certain favorable conditions. If it be not protected by powerful guns on the shore, it can be destroyed by the enemy's boats, under cover of the guns of the fleet; and if its protecting battery is not of the strongest description, it can be disabled, and communication between the shore and the torpedoes cut by an expedition from the ships.

The automatic torpedo, they say, cannot be effectively operated save at short distances, and as to the torpedo boat, they point to the recent experiences with Ericsson's Destroyer as proof that at best it is uncertain.

According to these authorities, little could be expected from any system of torpedoes or torpedo boats, in the face of a fleet of modern war ships, without the support of elaborate works ashore capable of at least temporarily staying the enemy's advance, and keeping him in play. It is furthermore their opinion that floating batteries are also an essential to an adjustable fire and a complete defense. Even single handed, such ships as the (English) Inflexible, the (French) Admiral Baudin, and the (Italian) Italia, Duilio, and Dandolo, might, they say, laugh at any torpedo practice not supported by heavy guns, well mounted and worked; and for a fleet composed of a dozen of England's best ships to enter New York, for example, should it be protected only by torpedoes and torpedo boats, it would be little more than an excursion. From the lower bay of New York, the big ships could throw a few projectiles, which weigh nearly a ton, into the southern end of New York and Brooklyn, while the smaller ones, protected by this hail of iron and steel, advanced and beat off the torpedo boats, and exploded or removed the torpedoes in the channel ways. Having accomplished this, the cities of New York and Brooklyn would be at the mercy of the enemy, and the sum this enemy might demand for foregoing his target practice at the neighboring architecture would scarcely be less than that which would have been required to fortify the principal forts of the whole country.

This sounds well, and were it not for the strong arguments brought forward by those authorities who believe that a system of torpedoes and torpedo boats can be made to accomplish all the purposes of defense, might almost be looked upon as conclusive. In a recent communication to the writer, a gentleman who for many years has had unusual facilities for watching the progress of marine constructions, and in a position to know the details of all the valuable improvements in the art of attack and defense, said: "I believe a fleet of torpedo boats, swift and well handled, would furnish a complete and effective defense to such a port as New York without the support of either a great fleet or powerful fortifications. Probably the enemy would not venture within ten miles of the shore if it were known we had a swarm of vast torpedo boats ready. One first class fort would cost as much as 300 effective torpedo boats. The stride made of late with these vessels is by no means appreciated by our naval people. For defense of our ports we need fleets of them, and nothing more—no iron clads, no fortifications. All we require is first class, highest speed torpedo boats, and plenty of them. One iron clad would cost as much as 50 torpedo boats, and in a harbor contest the big ship would be of little service as compared with the boats."

This statement was taken by the writer to Captain John Ericsson, in expectation that he would sustain it or give his reasons for espousing the other side. But when that eminent naval constructor was apprised of the nature of the visit, he showed a disposition to take on the silence of the tomb. He sent word that he would like to be excused from giving an opinion on the subject. He was asked if he believed New York harbor could be successfully defended against a modern fleet by torpedo boats and torpedoes of any description, and responded that he was not ready to answer the question. From this it seems not unreasonable to believe that this skillful and practical mechanician occupies a position as to the question in hand which might be described as "on the fence."

But there are many others, very excellent authorities too, who have climbed over the fence, and are now seeking to establish themselves on the other side. They point to the recent naval action between the French and the Chinese at Foochow, China, to illustrate what can be done with a well handled torpedo boat. In this action the French had only two torpedo boats, and yet at the very beginning of the engagement one of these succeeded in blowing up the Chinese flag ship.

When he got his orders, the commander of this torpedo boat singled out the flag ship, and without the precaution of maneuvering for position made straight for his prey. It would seem that the officers of the Chinese flag ship were aware of the nature of the errand the Frenchman was bent upon when he was yet at some distance, and opened play upon him with their machine guns, from both alow and aloft. But the smoke from the big guns was so thick that they soon lost him, and did not again make him out until he was close aboard, and it was too late for useful gun practice.

The crew of the torpedo boat, sheltered by the protecting shields, are said to have obeyed orders with an alacrity and precision that showed them to have great confidence in the success of the work that was being cut out for them. There was no hitch, no hesitation. The proper position was reached, the torpedo was sent on its errand.

It touched the hull, and a tremendous report followed. The great ship rose for a moment as if about to leap into the air, and settling back, she disappeared almost instantly into the sea. Only a few of her crew of 300 men were saved. The commander of the torpedo boat was hurt in the head, and another officer was shot in the arm. There were no other casualties.

The great clouds of smoke which resulted from the heavy gun practice made the work of the torpedo boat at once sure and safe. This is a point in torpedo boat warfare that should never be lost sight of in any discussion on this subject. A battery of big guns constantly fired will, in a short while, especially if there is little wind, generate a veritable fog, and shut out whole ships from view; and hence it follows that the more a ship tries to defend herself from an advancing torpedo boat, the more facile becomes the work of the latter to reach the prey. The commander of a torpedo boat need only see that he has the true compass bearings of the enemy, and then, when this enemy is lost in the smoke from his own guns, the torpedo boat is started in the already ascertained course.

Important improvements are constantly being made in torpedo boat construction. Plans have recently been drawn in England for a sea-going torpedo boat which it is confidently expected will steam for 1,600 knots at a mean rate of twelve knots the hour without recoaling, with a total displacement of only 70 tons.

When in action and required to do so she will, there

is reason to believe, attain a maximum speed of 27 miles an hour. The engines will be made to develop 850 indicated horse power. This armament will consist of two tubes in the bow for discharging torpedoes, two Nordenfelt machine guns in shell-proof turrets and shields, and two Hotchkiss guns of the same character. A model of this boat is now to be seen in the International Inventions Exhibition in England.

Admiral Cochrane, R. N., has devised a system of throwing twin torpedoes from two mortars simultaneously, with a connecting chain between the two, the idea being one of defense for the ship against torpedo boats. But this and the cellular hulled ship to withstand torpedo explosion give such little promise as to be scarcely worth mentioning.

There is a French war ship now building which has already cost twenty million francs, or four million dollars, and she will require another year and still more money to complete. Could she with the latest appliances aboard keep off a torpedo boat that cost one-fiftieth of what has been expended upon her?

Many readers of the SCIENTIFIC AMERICAN are, we know, well qualified to speak upon the subject; and if, after reading the evidence presented above, they should feel inclined to give their views, either on the one side or the other, we would be very glad to hear from them.

THE NIAGARA FALLS PARK.

Among the good works authorized by the Legislature of New York is the formation of a park at Niagara Falls, by which all the grounds and waters necessary for the preservation and public access to those great wonders of nature are secured to the people in perpetuity. The sum of one and a half million dollars has been appropriated by the State to secure the purchase of private property. Lands equal to a little more than one hundred acres have been bought. The grounds and buildings on both sides of River and Canal Sts. west and south of the hydraulic canal have been taken by the Park Commissioners. The lines extend to the main channel of the river, and middle of Horse Shoe Falls, being the boundary line between Canada and the United States, and the purchase takes in Goat Island and all the little islets, with their various mills, streets, and passage ways. By the terms of the act the whole tract is to be restored as far as possible to its original state of nature, and when this is accomplished, the trees grown, and all the improvements perfected, the attractions of Niagara will be increased a thousand fold. The original inception of this admirable project is due to Lord Dufferin when he was Governor-General of Canada in 1878. His plan was that the Canadians on their side, and the Americans on ours, should undertake to beautify and preserve the approaches to the Falls. His proposal was most cordially appreciated by our Governor, Lucius Robinson, and the grand project is now in process of being realized. But it has involved much hard work on the part of private individuals to overcome the hostile influences that were arrayed against the work, especially from property owners. The special association, of which Mr. Howard Potter and Mr. J. Hampden Robb were prominent members, was greatly instrumental in securing the required legislation.

COMETS DUE IN 1885.

Several periodical comets may be expected to return to perihelion during the present year. Encke's comet has already put in an appearance, having passed its perihelion on the 7th of March. It was detected in 1884, but as comets technically belong to the year in which they pass perihelion, Encke's comet finds place on the records of 1885. This comet is our oldest friend among the class to which it belongs, for it was first seen in 1786, though its periodicity was not discovered till 1819. Since that time, it has not failed to make us a visit at intervals of about 3⅓ years.

Olbers' comet is another celestial guest whose return is looked for during the present year. It was discovered by Olbers in 1815, and was found by Bessel to have a period of about 75 years. It will therefore probably appear either this year or the next. It will be as warmly welcomed, if it deign to make us a second visit, as the comet of 1812, or the Pons-Brooks comet, was last year, for it will rank as third on the list of comets of a long period that have made more than one recorded return. Halley's comet, with a period of about 75 years, stands first on the list. It has been traced back to the year 1456, and since that time has made 5 recorded returns, the last being in 1835. It will be due in 1911. The comet of 1812, or the Pons-Brooks comet, made its first recorded return during the last year. If the comet of 1815, or Olbers' comet, visit us during this year or the succeeding one, the solar system can rejoice in the possession of three comets of a long period, as they are called, to distinguish them from the larger family of comets of a short period.

Tempel's comet of 1867 was expected to reach perihelion in April. It has a period of about 6 years, was first observed in 1867, was seen again in 1873 and 1879, and was due in April, but has not yet made its appearance. On the 13th of March, Dr. Gautier, of Geneva, discovered a suspicious celestial object, that was thought to be the expected visitor. Diligent search was made for it at the principal observatories, but without success, for the object seen proved to be a far away nebula. Either some unforeseen calamity has delayed its advent, or one of the giant planets has turned it into a new course by its resistless power of attraction.

Tempel also discovered a second comet of a short period in 1869. It was rediscovered by Swift in 1880, when its periodicity was determined. It is consequently known as Swift's comet, and has a period of 5½ years. It is expected to return to perihelion at the end of the year. But it is likely to pass unseen at its present return, as it did in 1875, being, in like manner, in an unfavorable position for observation.

One more comet closes the list of members of the cometic family that are expected to return to perihelion in 1885. It is Tuttle's comet, and seems to occupy a position of its own, having a period of 13½ years, and therefore ranking neither with comets of a long period nor with those of a short period. It was first discovered by Mechain in 1790, and rediscovered by Tuttle in 1858, when its periodicity was recognized. It was observed in 1871, passing its perihelion in November. It is therefore due in July of the present year.

THE PRACTICAL MECHANIC.

The close subdivision of work in our best manufactories is conducive to uniform and generally good results, that is, that the tools and machines produced are of equable quality and uniform in build. A workman kept month after month on a single department, or a close branch of work in the shop, will probably become skillful in that branch; if he drills pieces by templates, he can drill them better than an ordinary workman can; if he makes the dies for drop forgings, he can do them better than the general mechanic.

In the manufacture of pistols, as an example, there are men who can make, temper, and test the main spring and the rear spring of the lock who cannot bore a pistol barrel or tend a rifling machine that makes the scores for the guidance of the ball in firing. But the man who drop-forges the frames from "mild steel" does a work fully as important, and yet he cannot make a pistol. In these and other instances the workman may be a good mechanic, but not a thorough mechanic. To carry the example still further, the man who does the "assembling"—the bringing together of the completed parts—should be a thorough mechanic. If he does not know how to do each and every job, he should know how each and every job should be done, or should have been done.

The system that includes the individual workman only as the intelligent part of the machinery is admirable as making him an exact reproducing agent, and consequently aiding in uniform results; but it is to be questioned whether it is the best plan to make intelligent American mechanics. It may be that possible excellence by it will be sacrificed to tolerable uniformity. Good mechanics of forty years ago have little sympathy with a system that lowers the status of mechanical condition to the level of the machine attendant, or the monotonous worker at a single branch. This system is not consonant with the freedom of individual endeavor that seems to be a part of the American mechanic's aspirations.

In one of the most prominent establishments for the manufacture of machinery, machine tools, and hand tools in the country the apprentices are subjected to novitiates as tests of their capabilities and their leaning in the different departments of work in the vast establishment. After a judicious trial of the cleaning of castings, the rough vise work, planing, turning at the lathe, and possibly boring, the apprentice takes a hand at pattern-making as a helper; then he goes to the draughting room, if he inclines that way. He graduates, finally, to his proper "posish," and is draughtsman, pattern-maker, forger, moulder, floor finisher, lathe man, planer man, or fine vise worker. With such a four years' chances the apprentice will come out a competent mechanic—if there is any competency in him.

After all, the old-time job shop was about as reasonable a school as the embryo mechanic could desire. The superintendent of one of the best known establishments in the country recently died. In conversation some time ago he stated that his intimate knowledge of the different departments of the work was got from his experience in a "job shop," where he had a chance at everything, from building a steam engine to repairing a hoisting winch; he worked at the vise, the lathe, the planer, sometimes at the forge, and always tempered his tools. He made his own drawings (sketches), and frequently made his own patterns. These amateur accomplishments must have been crude, but they gave him the idea of *how* a job should be done, as well as what was to be accomplished. He was an example of one sort of a practical mechanic, of which there should be more.

THE President thinks that the wisest course to pursue with the New Orleans Exposition is to close it. Almost everybody who has had much to do with the Exhibition concurs with President Cleveland's decision.

The Baseball Manufacture.

It is estimated that 10,000,000 baseballs are made and sold in this country every year. Perhaps very few persons knows the process by which these ball are manufactured or the nature of the stuffs used in constructing a standard ball. The most expert workmen are employed. First there is a little hard rubber ball, and around that the wrapper winds a strong, blue, coarse yarn. When this reaches a prescribed size, it is firmly wrapped with white Venetian yarn.

The balls are then placed in an oven and baked until all the moisture is taken out of them and they are reduced in size. This makes them solid. After this they are coated with cement. This causes the balls to retain their shape, and they cannot be knocked crooked. Then comes some fine blue yarn, and around the whole is placed fine white gilling twine. The balls are weighed, for each must be of certain weight, and are now ready for the covers. These latter are made of the best quality of horse hide. The cover consists of two pieces, each cut in the shape of the figure "8." By bending one section one way and the other in an opposite direction, a complete cover is obtained.

For years balls were covered with four pieces of leather, and at one time two covers were placed upon a ball; that is, the ball was half made when it was covered, and then another ball constructed over it. But even that did not prevent its being knocked out of shape. They cannot disturb the ball as now made, because the cement holds it.

A little machine owned by a Philadelphia firm is used for winding the balls. It wraps 2½ ounces of the American Association balls in a minute, and the rest is finished by hand. That apparatus is a little wonder. It does its work as neatly as if it had brains, but is capable, say its owners, of a good deal of improvement.

Lesseps and the French Academy.

The reception of M. Ferdinand de Lesseps, on April 23, as a member of the French Academy, had somewhat the form and tenor of a celebration, in which the Academy perhaps justly glorified itself while marking its great appreciation of the importance which the Suez canal, built by a French engineer, has attained in its effect on the commerce of the world. The members of this Academy are frequently spoken of, in France, as "the immortals," and certainly not without some reason, when one calls to mind the long line of eminent men who have been connected therewith, from the time when Richelieu first insisted on giving the parent organization the protection of the French government. The savants who constituted the first society were mostly dialecticians and philosophers, and would have preferred meeting privately, but the great cardinal urged, in a way not to be resisted, their incorporation as a public body, which has, with many changes, enlargements, and divisions, had an almost continuous existence ever since, under the direct patronage and financial support of the various governments of France. There are now really five academies, under the name of the Institut de France, all bearing the same relation to the Institut that colleges do to a university.

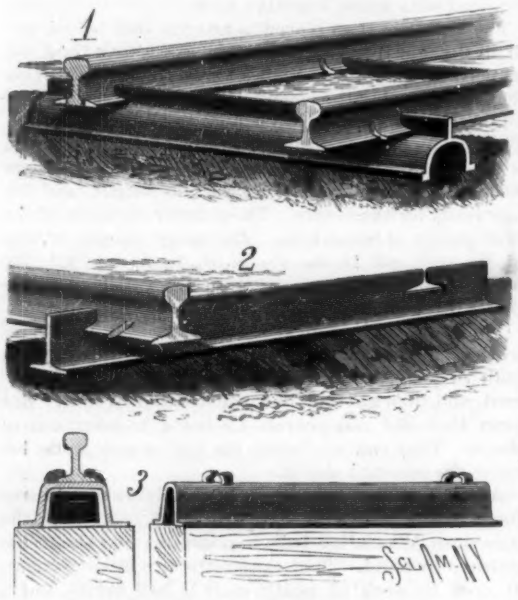
At his reception, M. De Lesseps spoke of himself as a "geographer," but this is hardly the title which the reading public would most generally accord to him. The great work by which he is best known characterizes him, perhaps better than any other way, as one of the most eminent of living civil engineers, although it is to be remembered that he is now in his eightieth year, and it was not till after he was fifty years old that he embarked seriously on the Suez canal enterprise. Previous to that time he had been connected in various capacities with the French diplomatic service in Spain, Portugal, Egypt, and Italy; and the ability he displayed in raising first the money needed for his Suez canal, and so recently the larger amount required for the Panama canal, surely indicate that he possesses capabilities of no ordinary character as a diplomatist. He was generally believed a dreamer in his first great enterprise, and the doubters as to his present work are by no means few, but there can be no question as to the high esteem in which his name is held in this country, as well as in France, which so delights to do him honor.

The Cooper Union, New York.

This free institution is doing a good work in educating and improving the young people of this city. An abstract of the last annual report shows that during the year there were 4,208 pupils in its schools. Of this number 531 attended the Industrial Art Classes for Young Women in the day time, including the classes in phonography and telegraphy. More than 650,000 persons have used the reading room during the year, and nearly 200,000 books have been lent to readers to take to their homes. The evening art schools are largely attended, and there are also scientific classes which pursue a regular course of study extending over a period of five years. Thanks to the benefaction of its founder, the Cooper Union appears to be doing a larger share of this useful kind of educational work than any other institution in the country.

METALLIC RAILWAY TIE.

The accompanying engraving represents a railway tie made of metal to insure cheapness and durability, and provided with means for securing the rails so as to allow the removal of one or more ties from the road bed and their renewal without disturbing either the others or the rails. The tie is formed of sheet metal rolled into the U-form shown in Fig. 1, and made



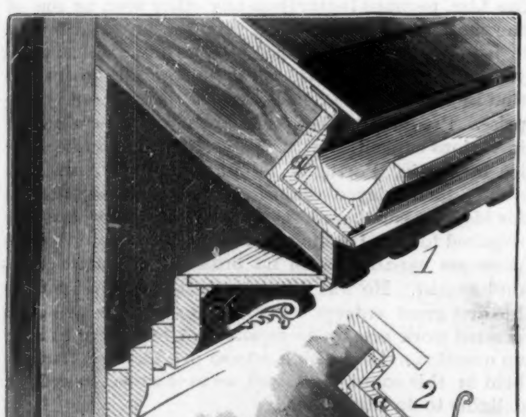
GLYNN'S METALLIC RAILWAY TIE.

with flanges on its edges extending outward so as to give a broad bearing; the flanges also prevent, by the weight of the ballast on them, any rising or springing of the tie. Upon the upper side of the tie are ribs formed to lap upon the flanges of the rail, so as to hold the latter securely down to place. The rail flanges are notched, so that the rail can be set down upon the tie, the rib fastenings passing through the notches, when, by an endwise movement of the rail, the fastenings will be locked over the solid portion of the rail flanges. In Fig. 2 the tie is in the form of an inverted T, with the web slotted to receive the rail flanges in the same manner as above described. In Fig. 3 the tie has hook shaped fingers, between which the rail is placed. In this case the fastening devices are located so as to adapt the tie, for use as a longitudinal sleeper, but they may be applied to cross ties. In order to remove a tie, it is only necessary to remove the ballast for a short distance and then shift the tie sidewise until the fastenings are over the notches in the rail flanges, when the tie can be dropped down and drawn out endwise; a new tie can then be inserted.

This invention has been patented by Mr. M. A. Glynn, whose address is care of Messrs. J. C. Burnham & Co., Havana, Cuba.

AN IMPROVED CORNICE GUTTER.

The cornice gutter herewith illustrated is so constructed that the water in it, when backed up and



NEWTON'S IMPROVED CORNICE GUTTER.

caused to flow over the back of the gutter, cannot pass into the building. This form of gutter does not cover and obscure part of the cornice mouldings, as do those which are suspended by hangers at the top edge of the cornice moulding.

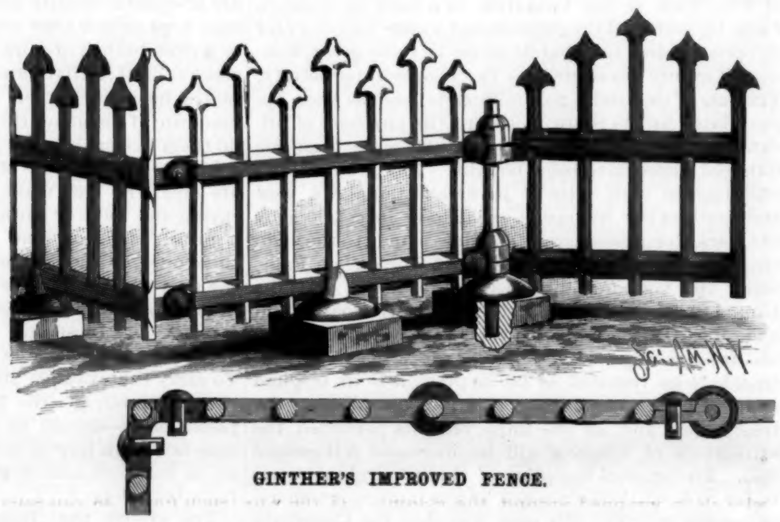
Above the top moulding of the cornice, and in the lower ends of the rafters, or on furs secured to the walls or rafters, a plank or metal pocket is formed, over which the shingles project slightly, the lower ends of the rafters being notched to receive the pockets. When made of plank the pocket is, preferably, provided with a lining of sheet metal as shown in the engraving. On the bottom or bottom and back of the pocket are cleats spaced sufficiently near to support the gutter, which is secured upon the cleats, and which may be made of wood or metal (Fig. 2 shows it of sheet metal), with its front shaped so as to form a continuation of the cornice moulding. The cleats are first secured to the under side of the moulding and then to the back of the pocket by screws. When the water backs up in the gutter, it can pass down between the back and bottom of the gutter and flow down and drop from the edges of the pocket, its entrance into the building being thus prevented.

All further information concerning this invention can be obtained from the patentee, Mr. Dudley Newton, Bellevue Avenue near Kay Street, Newport, R. I.

IMPROVED FENCE.

The invention shown in the annexed engraving is designed to produce a section fence easily and quickly set up or taken down, adaptable to irregular lines or curves, and that may be quickly opened at any point for the passage of either persons or vehicles. The improvement consists essentially in swiveling each panel, thereby making each one act as a gate.

A panel of fencing is secured to a disk, which has projecting from its under surface a pin resting movably in a block of any suitable material set in the ground. The ends of the rails are rabbeted, and the panels are joined together by a key and wedge passing through the overlapping rails. At the corners a rabbeted angle piece is used. A post, raised on one of the disks or pivots, carries the gate, the post passing through short rabbeted pieces joined to the end of a panel. It is evident that by removing the keys either of the panels may be turned upon its pivot, and so be used instead of a gate of the ordinary pattern. The many advantages possessed by a fence of this construction will be readily perceived.



GINTHER'S IMPROVED FENCE.

Mr. H. S. Ginther is the inventor of this fence, and particulars can be had by addressing Messrs. H. S. Ginther & Co., P. O. box 96, Bridgeport, Ill.

Mystery Gold.

At the present time a considerable amount of jewelry made of this alloy is believed to be manufactured, chiefly with the object of defrauding pawnbrokers to whom it is offered in pledge; and as it will stand the usual jeweler's test of strong nitric acid, the fraud is often successful. The article examined was a bracelet that had been sold as gold to a gentleman in Liverpool.

The alloy, after the gilding had been scraped off, had about the color of 9 carat gold. Qualitative analysis proved it to consist of platinum, copper, and a little silver; and quantitatively it yielded the following results:

Silver	2·48
Platinum	32·02
Copper (by difference)	65·50
	100·00

Strong boiling nitric acid had apparently no action on it, even when left in the acid for some time.—*W. F. Lowe, Chem. News.*

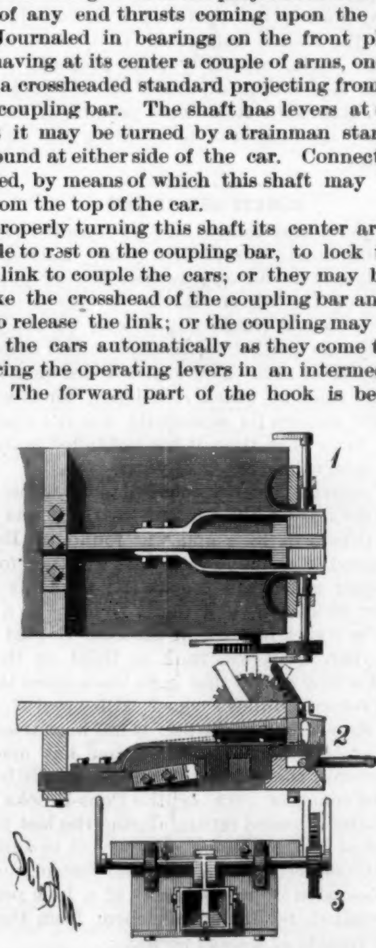
Lightning Rods for Human Beings.

Mr. P. B. Delany, of this city, inventor of the wonderful synchronous telegraph system, has recently patented a lightning rod for the human body. It consists of a large copper wire that passes down the back, with branches extending along the arms to the hands, and along the legs to the exterior of the shoes and to metal soles thereon. The wearer if provided with this rod may, if standing on the ground, handle electric light wires with impunity; and if out in a thunder storm, would stand a good chance of not being hurt if his rod were struck by lightning. Mr. Delany ought to carry a branch of his rod up the back of the neck, and have it connect with a point on the helmet of the policemen, and so give them protection. It has heretofore been proposed to have lightning rod umbrellas, that is to say, an umbrella provided with a flexible wire that extends from the tip or ferrule over the outside of the umbrella, the wire reaching to and allowed to trail on the ground.

CAR COUPLING.

It is not necessary for the trainmen to go between the cars to operate the car coupling herewith illustrated, and dangers to life and limb incident to the common methods of coupling cars are avoided. The draw head draws on a strong bolt passing through its back end and through a plate bolted to the crossbeam; there is sufficient looseness in the plate and around the bolt to permit the front plate of the coupling to play up and down on bolts passing through slots in the plate into the car sill. The drawhead passes through an opening in the front plate made wider than the head to allow the side parts of the latter to have lateral play. The front of the drawhead is supported by a cross bar bolted to the main body of the front plate, as shown in the longitudinal section, Fig. 2, and in the front elevation, Fig. 3. Fig. 1 is an under view of the coupling. The forward end of the center bar of the drawhead is formed with a tenon which enters between the front side parts of the drawhead, and is held to the crossbar by a bolt. These side parts are fastened to springs bolted to the center bar, as shown in Fig. 1. Curved springs fastened to the front plate act to hold the front side parts against the tenon. These springs allow the parts to give way sidewise by any lateral pressure of the link either way on them, as when the cars are rounding curves, and will carry the link to a central position again on a straight track. The link rests in a socket in the drawhead above the end part of the center bar. The upper inner portions of the side parts of the drawhead are cut away to form a recess to receive the hook end of the coupling bar, which is bolted to the top of the center bar near its rear end, and is made of spring metal; the tendency of the end of the coupling hook is to spring downward into a notch made for it in the top of the tenon part of the drawbar. The opposing faces of these bars are formed with projections (Fig. 2) which fit edgewise against each other when the hook is in coupling position, so that the meeting faces of the projections will take the strain of any end thrusts coming upon the coupling bar. Journaled in bearings on the front plate is a shaft having at its center a couple of arms, one at each side of a crossheaded standard projecting from the top of the coupling bar. The shaft has levers at each end so that it may be turned by a trainman standing on the ground at either side of the car. Connections are provided, by means of which this shaft may be operated from the top of the car.

By properly turning this shaft its center arms may be made to rest on the coupling bar, to lock the hook in the link to couple the cars; or they may be raised to strike the crosshead of the coupling bar and lift the hook to release the link; or the coupling may be set to couple the cars automatically as they come together, by placing the operating levers in an intermediate position. The forward part of the hook is beveled, in



DENNEY'S CAR COUPLING.

order that the approaching link may force the coupling bar up.

This invention has been patented by Mr. William F. Denney, of Millbrook, Mich.

Effects of Heat on Iron Columns.

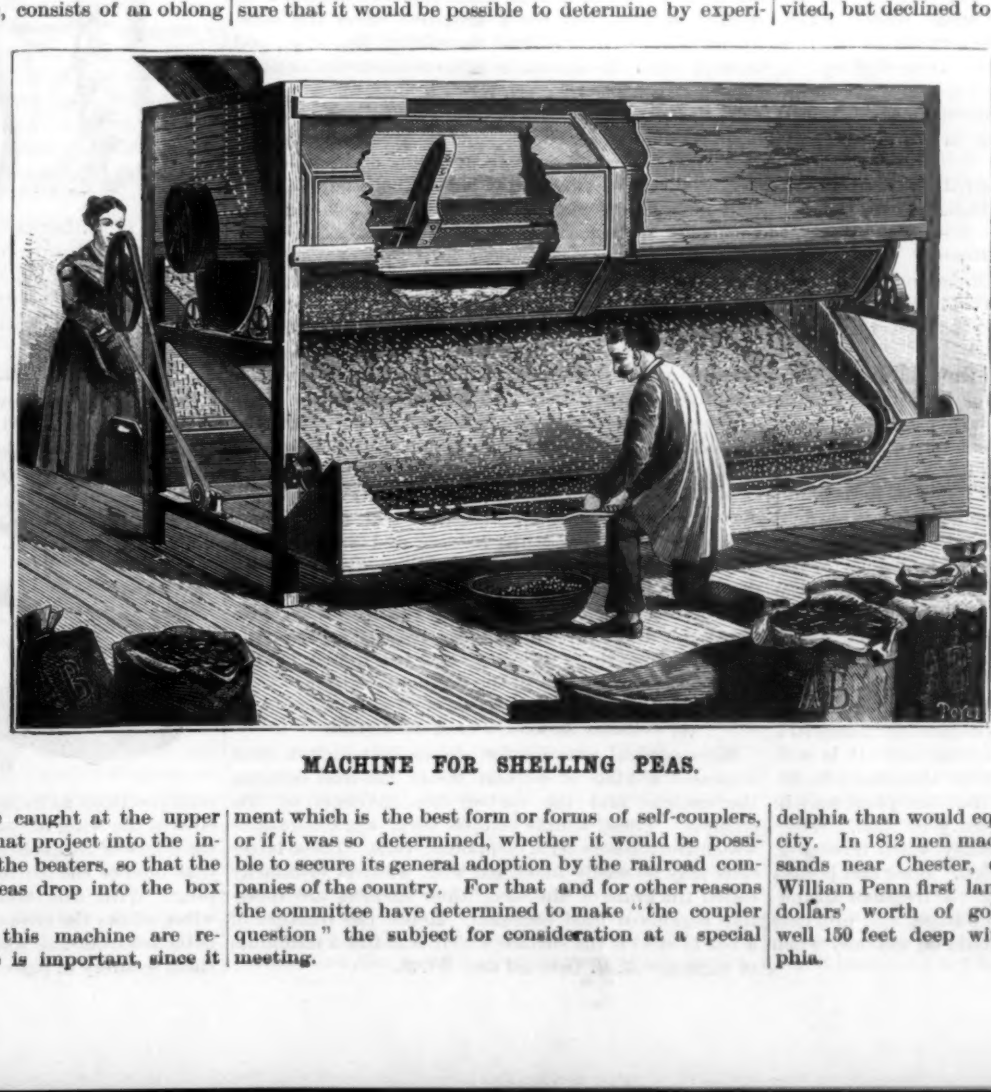
Some experiments, according to the *Builder*, have recently been made in Munich, by Professor Bauschinger, to determine the comparative security of exposed cast and wrought iron columns in case of fire. It is well known to most architects that cast iron columns are liable to warp and crack when subjected to the heat of a conflagration, particularly if cold water is thrown upon them while they are hot, and precautions against this are now very commonly employed where iron columns are used in building. In New York the law requires that all cast iron columns which sustain walls shall have an independent exterior casing to protect them both from the heat of a fire and from water; and a similar regulation, extended to all cast iron columns used in building, has lately been adopted in Berlin. Columns of wrought iron, however, which are of course much less brittle than those of cast iron, are allowed to be used there without protection, and Professor Bauschinger's tests seem to have been made primarily with the intention of obtaining information as to the behavior, under the conditions which exist in a building on fire, of these columns, which, though often used by engineers for supports of bridges, are seldom employed in strictly architectural work. For the purpose of experiment, unprotected columns, both of cast and wrought iron, were loaded with the average weights which they are expected to sustain in actual buildings, and were then heated, first to a temperature of three hundred degrees, then to six hundred, and finally to a red heat, and were then suddenly cooled by a jet of water from a hose. Under these circumstances the cast iron columns warped and cracked, as was expected, but did not yield entirely, while the wrought columns began to bend before they were heated to redness, and were so violently distorted when cold water was thrown upon them that they could no longer support their load. No doubt the form of the wrought iron column would determine to some extent its liability to bend when heated, but it is worth remembering that at least in this case they have proved inferior to those of cast iron, and seem to require protection against fire quite as much as the cheaper kind. The simplest protection, as we may again remind our younger readers, both for cast and wrought columns, consists of a coat of plaster, put on wire cloth wrapped around the column. If the wire cloth is held out a little from the iron by wooden furrings, or by corrugations in the cloth, so as to give the plaster a good key everywhere, a perfect and permanent protection is secured at very small expense, and we should not be sorry to have the law require such protection for all columns used in building. —*Amer. Arch.*

MACHINE FOR SHELLING PEAS.

This curious machine, which we saw in operation at the last Agricultural Exhibition, consists of an oblong frame in which revolves a hexagonal drum. This latter, which is surrounded by wire cloth, is supported by rollers and is revolved through the intermedium of a pulley. An axle concentric with the drum carries a number of oblong pieces arranged obliquely around it, and revolves in the same direction that the drum does, but with much greater velocity. These oblong pieces or beaters pass within a short distance of rods that form the angles of the drum. Beneath the whole is stretched an endless apron that revolves continuously.

The peas are placed upon the platform of the machine and fed by hand to the drum through a hopper at the top. They are then submitted to the action of the beaters, which open the pods and allow the peas to fall through the meshes of the wire cloth. In consequence of the oblique arrangement of the beaters, the pods continue to advance toward the extremity of the drum, where they fall into a chute. The unshelled peas are caught at the upper part of the drum by the rods that project into the interior, and are thus struck by the beaters, so that the shelling is perfect before the peas drop into the box beneath.

The results obtained with this machine are remarkable, and its performance is important, since it can do as much work as several hundred women in the same length of time.—*La Nature.*



MACHINE FOR SHELLING PEAS.

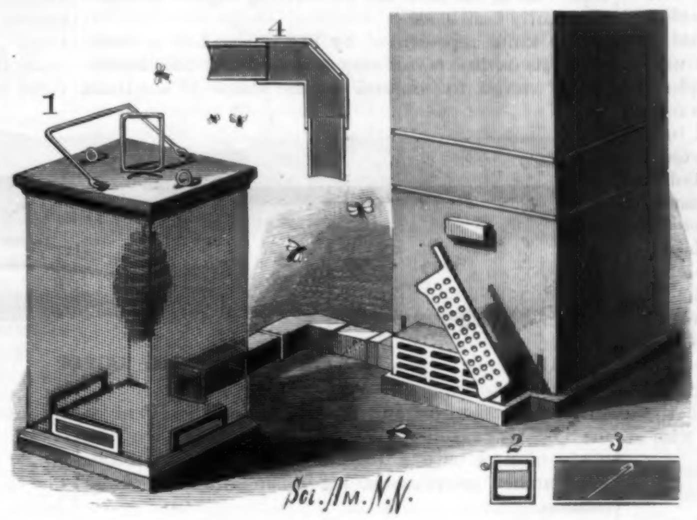
Self-acting Car Couplers.

The Master Car Builders' Association has decided to hold a special meeting at the Hygeia Hotel, Fortress Monroe, Va., on June 10, to consider the coupler question. The committee have issued a circular to railway officers and others interested, inviting them to attend, from which circular we take the following:

In a number of States the use of some form of automatic safety car coupler has been made obligatory on railroads by legislative enactment. In most, if not all, of the laws of this kind which have been passed, the special form or kind of coupler to be used is not specified, but it is left to the railroad commissioners of each State to decide what couplers will comply with the requirements of the law of that State. This will naturally lead to the adoption of a variety of couplers on the different railroads of the country; and it is believed that while legislation of this kind may temporarily satisfy the popular clamor for some action which will reduce the risk and danger of coupling cars, it seems probable that, unless the railroad companies agree to use either one form of self-coupler, or only such forms as can safely be used in connection with each other, the danger to the men who couple cars will be increased instead of diminished by this action of the State legislatures.

At the last convention of the Master Car Builders' Association a resolution was passed instructing the Executive Committee to solicit the co-operation of all railroad companies in an attempt to decide experimentally the comparative merits of various automatic car couplers.

After due consideration the committee do not feel sure that it would be possible to determine by experiment which is the best form or forms of self-couplers, or if it was so determined, whether it would be possible to secure its general adoption by the railroad companies of the country. For that and for other reasons the committee have determined to make "the coupler question" the subject for consideration at a special meeting.



FERGUSON'S COMBINED BEE SWARMER AND HIVER.

COMBINED BEE SWARMER AND HIVER.

The object of the contrivance represented in the engraving is to conveniently control the swarming and hiving of bees. At the hive entrance is placed a trap, in the rear side of which is an entrance, the size of which can be regulated by sliding gates. By adjusting the slides so that only one bee can pass at a time, the bees can easily guard the hive against robber bees. The front of the trap is provided with a bar door, the spaces of which are large enough to permit the passage of the working bees but not the queen, and also with a perforated door through which only the workers can pass. These doors are hinged so as to swing open and shut through vertical planes. In one or both ends of the trap is an opening to receive the end of a conductor, the first length of which is made of wire gauze to admit light, so that the queen can readily find her way into the conductor. The second length, Figs. 2 and 3, has a drop door made of mica or other transparent material to transmit light, so that the queen, in seeking to escape, will raise and pass the door, thereby being prevented from returning. When the conductor turns as in Figs. 1 and 4, the elbow is provided with a transparent plate. The other end of the conductor enters the wall of the cluster cage, which is formed with a number of entrances to admit the bees. The wall of the cage is of wire gauze. The lower frame of the cage is permanently attached to a bottom, while the top is formed with slots to receive set screws screwed into the top frame; the top can be secured in place by turning the set screws at right angles with the slots. The handle of the cluster block placed within the cage passes through a slot in the middle of the top, and has a loop at its upper end. The lower part of the loop is at right angles with the cluster block, so that the latter can be supported by turning the loop one-quarter around. The loop also serves as a handle for carrying the block. A bail is hinged to the top of the cage.

In using the apparatus the trap is placed in front of the hive entrance, and the perforated door raised to allow the workers and drones to pass. The only passage for the queen to escape by is through the conductor into the cage. The bees then enter the cage through the openings, and cluster upon the block; the swarm can then be readily transported to a hive. If desired, the outer end of the conductor can be connected by another trap with a second hive.

This invention has been patented by Mr. Sylvester E. Ferguson, P. O. box 996, Eureka Springs, Arkansas.

Electric Light Tests.

The electric light life test which has been going on at the Franklin Institute, Philadelphia, has reached its 1.064th hour. The Edison, the Weston, the Stanley, and the Woodhouse & Rawson companies competed. The Sawyer-Man and Brush-Swan Companies were invited, but declined to participate in the trial. Extraordinary precautions were taken to prevent access to the lamps except by members of the committee. The lamps were lighted on April 11, and have burned ever since. At 11:35 this morning the Edison Company, who had entered 21 lamps, had lost 1; the United States Company, who entered 24, had lost 17; the Stanley Company had lost 19 out of 22, and Woodhouse & Rawson, an English firm, had lost 11, or their whole number entered. The Edison Company used the natural fiber bamboo carbon, while the Weston people used the artificial tamidene carbon.

Gold Found Everywhere.

It has long been well understood that gold is the most universally distributed of metals, being found in all parts of the world, but most readers will probably be surprised at a statement recently made by Prof. A. E. Foote, of Philadelphia, to the effect that there is more gold in the clay under the city of Philadelphia than would equal the entire valuation of the city. In 1812 men made sixty cents a day washing the sands near Chester, on the Delaware River, where William Penn first landed, and quite recently several dollars' worth of gold in grains were taken from a well 150 feet deep within twenty miles of Philadelphia.

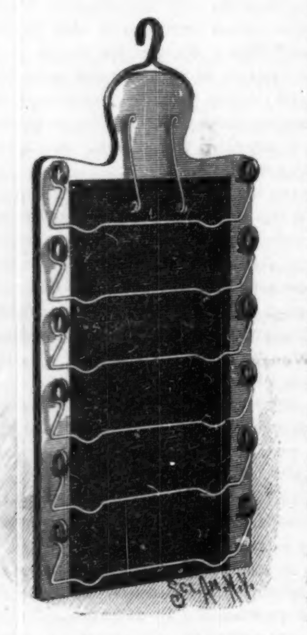
Professor Langley at the Royal Institution.

Professor S. P. Langley, of the Allegheny Observatory, lectured recently at the Royal Institution on "Sunlight and the Earth's Atmosphere." Sir William Bowman, F.R.S., presided. Professors Tyndall, Frankland, Dewar, and others were present, and the attendance was large.

Professor Langley explained that his experiments at the top and bottom of a high mountain had proved that the ultra red end of the solar spectrum is much longer than previously supposed, that the color of the sun is probably blue or bluish-white, and the color of the earth's atmosphere somewhat orange; that the power of the solar radiation has been hitherto underestimated, and that the absorption of the atmosphere is nearly double that previously supposed. These results of his were generally known before his arrival in this country. He exhibited his celebrated bolometer for measuring extremely feeble variations in heat, but performed no experiments with it, on the ground that they would take up too much time. He also projected on the screen a sectional diagram of the apparatus he used, but did not describe it, on the ground that a description would not interest the listeners. In fact, he altogether underestimated the culture of the auditory before him, told them almost nothing they did not know before he began to speak, but gave some entertaining descriptions of mountain and desert scenery, forming a lively, popular lecture, which much amused those present, and left them about as scientifically wise as they were before.

RACK FOR EXHIBITING NOTIONS.

The cut shows a device for holding and exhibiting notions—such as handkerchiefs, gloves, hosiery, and the like—in such a way that they can easily be removed. Held on a board is a series of transverse wires, which are bent U-shaped, and have their ends bent to form spiral springs; the ends of the wires are then secured in the face of the board at the side edges. Each transverse wire is provided near the ends with loops for receiving the fingers to pull the free parts of the wires from the board. A bail is pivoted on the side edges of the top of the board.



The articles to be displayed are held against the board by the tension of the wires under which they are placed. A piece of fabric secured on the face of the board prevents the articles from slipping. A price or advertising card is held by spring wires on the upper end of the board. By means of the hook formed in the bail the board can be hung in any conspicuous place.

This invention has been patented by Mr. John W. Shideler, of 180 E. North Street, Indianapolis, Ind.

Management of Roses.

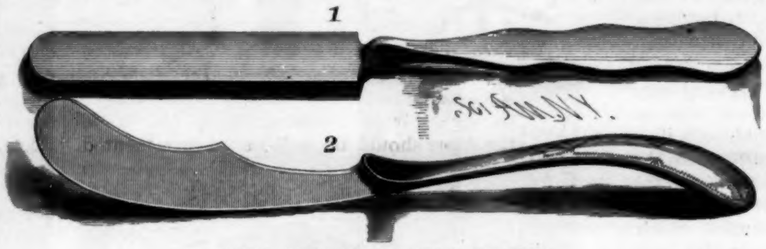
The following good practical directions for the care of roses, more particularly the hybrid perpetuals, were given by J. H. Bourn, in his address before the Massachusetts Horticultural Society:

The ground for roses should be thoroughly drained, rendered as porous as possible, and fertilized. In clay soils the use of sand, lime, soot, burnt earth, and loose, light vegetable matter, such as leaf mould, will alter the texture and improve the quality. At the time of planting, strong fertilizers are not required, and should not be given until the bushes have become established; they then like rich soil, which should be made light for the delicate rooting kinds, and more tenacious for the robust and hardy, and it would be reasonable that the classes and varieties differing in their nature should have more than one soil, if all are to receive that which is the most suitable. A renewal of the surface soil with old pasture loam every two or three years will supply important elements unattainable by any other method. We should avoid the application of more fertilizers in a soluble state than the plants can consume. It is well that the earth should be filled with stimulants in different stages of decomposition, that the plant may in all conditions of growth have plenty of food. When the plant is growing, and especially when flowering, weak liquid manure may be applied. Bone and potash act favorably early in the spring. A frequent sprinkling of water adds health to the foliage, and prevents injury by insects. The earth should be wet only when dry, and then thoroughly.

COX'S IMPROVED TABLE KNIVES.

In the accompanying cut are represented new forms of knives that have recently been patented (four of late date) by Mr. A. W. Cox, of 142 Union St., Newark, N. J. They are of a practical shape, can be cheaply manufactured, and will stand a great deal of wear, not being damaged by being put in hot water. Fig. 1 is a double edge knife, having the handle a little longer and the blade somewhat shorter than the knife in ordinary use. In taking this knife into the hand it always will be right side up, as there are two cutting edges. It is also pleasantly balanced.

The knife represented by Fig. 2 has but a single edge, its outline being very graceful, and the handle being curved to conform to the shape of the hand while in position for cutting the food. These knives may be made solid—all steel—or the blade may be made of steel with a handle of common material. For further information, see Business and Personal column.



COX'S IMPROVED TABLE KNIVES.

The Hypodermatic Injection of Oil.

At the recent meeting of the American Medical Association, New Orleans, a paper on the above subject was read by Dr. John V. Shoemaker, of Philadelphia. Experimental and clinical observations have taught us that oils that cannot be swallowed, or are rejected by the stomach, can be absorbed by inunction and subcutaneous injection. Not only has the rapid and good purgative result of oils used hypodermatically been demonstrated, but its nutritive action when thus applied has been shown to be valuable in debility, dyspepsia, scrofula, tuberculosis, and in certain diseases of the skin and nervous system. It is the quickest and best method of introducing oil into the system. It is an invaluable means of combating disease, particularly where more nutrition is required, and also for those patients who are either unable to swallow oil, or who cannot absorb or assimilate it by the alimentary canal. Oil can be used subcutaneously alone or combined with other suitable agents that can be easily dissolved in it. It is a valuable menstruum for suspending in it other drugs for hypodermatic use. It can be given in connection with a suitable diet, and even with other medication by the mouth, or it can be used alone for alimentation. Oil deposited in this way in the tissues is absorbed, and is no doubt assimilated, and will alone keep up the nutrition of the body. For a purgative action one or two injections of a drachm or two of castor oil usually suffices, but for a nutritive effect the same quantity of one of the bland nourishing oils—*e. g.*, cod liver or olive oil—should be administered two or three times daily.

In the event that alimentation is depending solely upon the injections, they should be given about every two hours. For the purpose of giving oil hypodermatically, a large syringe provided with a needle of good caliber should be used, and the instrument should have a capacity of from two to eight drachms. The injections can be made in almost any part of the body well provided with subcutaneous cellular tissue, into which the oil should always be thoroughly deposited. The points usually selected for the injections are the superior and inferior scapular and sacral regions, on account of the subcutaneous cellular tissue being especially abundant there. Injections can also be made in the arms, the chest front laterally, and back, the buttocks, and the legs. There is more or less irritation at the point of puncture of the skin, about the same as will be seen from the use of almost any other hypodermatic injection; sometimes there will also be some attending smarting, with redness and swelling and the formation of a nodular elevation, which usually disappears in from twelve to forty-eight hours. No induration or inflammation follows the injections, provided the usual precautions are observed in using the hypodermic syringe properly, and the tissues in the person receiving it are in the normal condition.

Cellular Structure of Melted Steel.

Microscopical examination shows that molten steel possesses a kind of cellular tissue, the iron forming the nucleus and the carbon the envelope of the cellules. These simple cellules form agglomerations which the authors term compound cells. These latter cells may be easily identified with what is ordinarily called the grain of the steel; their surfaces are therefore regions of least cohesion. Hence the fracture of a bar of steel is the surface which contains a minimum of carbon.—*M.M. Osmond and Werth.*

Purifying Air by Means of Water.

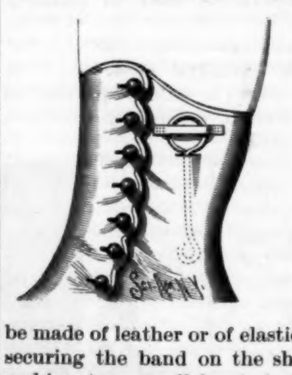
At a recent meeting of the American Surgical Association, Washington, a device for atmospheric purification was described by Dr. David Prince, of Jacksonville, Ill. After a brief *resume* of the use of antiseptics and disinfectants, he went on to speak of the purification of the air of operating rooms. Was it not practicable, he asked, in view of the effect of rainy weather upon the number of microbes floating in the atmosphere, to subject the air entering an operating room to the influence of artificial showers, so as to precipitate to the ground the whole or the greater part of these organisms? They were known to be heavier than the air, because they entirely disappeared from the air within a tight box which had been for several months in one position, but the principle of rest was impracticable. The same was true of dry filtration, by means of cotton or other like substances used to entangle matter floating in the air, on account of the rapidity with which it was necessary for the air to enter and leave the room in order to displace the germs. If, however, we could cause the air entering the room to pass through several showers of water, we had an expedient which might entangle these objects, and carry them to the ground. The speaker gave an elaborate description of such a device, spray being used in an apartment beneath the operating room, through which the air could be made to pass before entering the room.

Heat and Cold to the Hands as a Therapeutic Measure.

Vasilieff ("Ctrlbl. f. d. Ges. Therap.," London *Medical Record*) has found, as the result of a hundred experiments, that if the hands are bathed for half an hour in water of a temperature of from 86° to 95° F., the temperature in the external auditory meatus is increased, the pulse and the respiration are accelerated, and the blood pressure in the temporal arteries is considerably increased, with distention of the retinal veins. On substituting for the warm water a like quantity having a temperature of from 40° to 55°, the effects are exactly the contrary. The inference is that bathing the hands with cold water is an excellent way to combat cerebral hyperæmia. It is stated by Askotchensky that obstinate epistaxis may be stopped by this simple plan.

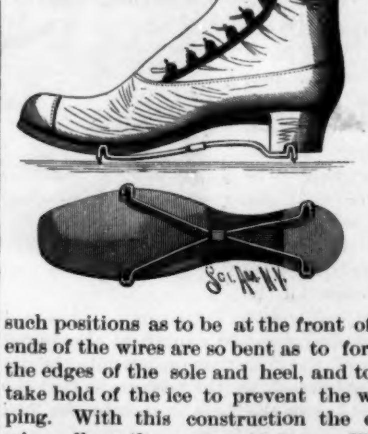
BUTTON HOOK HOLDER FOR SHOES.

The engraving illustrates an invention lately patented by Mrs. M. F. Frey, of 67 N. New Jersey Street, Indianapolis, Ind. A small incision is made below a band secured on the outer side of the leg part of the shoe, behind the ankle. The button hook is passed under the band and through the incision, and enters between the leather and lining, the eye or ring of the hook being between the band and leather. The band may be made of leather or of elastic material; or in place of securing the band on the shoe, it may be formed by making two parallel cuts in the leather. The button hook is thus held securely, is always at hand, and does not interfere with walking.



IMPROVED ICE CREEPERS.

The ice creepers shown in the cut are the invention of Mr. Peter B. Laird, of 73 Third Avenue, Brooklyn, N. Y. Two elastic wires of suitable size are secured to each other at their middle parts by a band. The arms of the wires curve from each other, and the rear ones have shoulders formed in them in such positions as to be at the front of the heel. The ends of the wires are so bent as to form lugs to clasp the edges of the sole and heel, and to form points to take hold of the ice to prevent the wearer from slipping. With this construction the elasticity of the wires allows the creepers to be readily applied to and detached from the soles of boots or shoes, and holds them securely in place when applied.



Correspondence.

A Cocoanut Invention Wanted.

To the Editor of the Scientific American:

As a frequent reader of the SCIENTIFIC AMERICAN, I take the liberty of addressing you with respect to a want which is greatly felt by the owners of cocoanut plantations in this colony; and as in your country inventions for the economy of labor are of daily occurrence, I feel assured you might, through the medium of your valuable journal, induce some of your many inventors to endeavor to make a machine that will assist in the manufacture of cobera (*i. e.*, the cutting out of the kernel), and saving of labor. At present the cutting out of the nut is done entirely by hand with a six inch knife, which is a very slow process; and as the cost of labor is very high, steadily increasing, and supply limited, it would be of the greatest importance if such a machine could be made that would work satisfactorily.

The machine would be required to cut out the kernel of the nut just as it falls from the tree, but with the outer husk on. We could split them open as we do now, with an axe (at present we have no use for either husk or shell, except for fuel). It must be adapted to cut nuts of variable size, as cocoanuts vary very much in size and shape, some being quite round and others oval shape and all sizes, simple in construction, and strong without being heavy, as it would be worked by black labor. The motive power could be either hand or foot. It would not matter what size or shape it cut the kernel out, as long as it cuts it in *solid* pieces; the size we cut out by hand is about three-quarters of an inch thick by about three inches long.

If such a machine could be made, a large number would be ordered, if not too expensive, as our principal product of export is dried cocoanut (called cobera or copra), and every planter would have some.

Fr. Yarte & Co.

Javenni Fiji, Fiji Islands, March 11, 1885.

A Torpedo Reminiscence.

To the Editor of the Scientific American:

Your article on "Torpedo Swimmers—Old and New" recalls to my mind an enterprise that I was engaged in during the war between the States. I submitted a plan to General Price, and through him to the higher authorities, to destroy simultaneously all the Federal gunboats on the Mississippi River, then located opposite Arkansas and upper Louisiana. The object to be accomplished was to enable the commanding general to transfer troops across the river to re-enforce the central and eastern army of the Confederacy. I was at the time in command of some engineer troops in the Trans-Mississippi Department, and would have carried out my plans had it not been for the lack of means to manufacture all of the explosives required.

The plan was to train the most reliable and enterprising of my men to the following duty: I proposed to start out into the center of the river, or point to be sought, as experimental number of strokes showed necessary, to be on a line with the anchored gunboat, and some distance above it, and after floating down to within sight a drag anchor would have been dropped overboard to steady the boat. The next thing would have been to start two men from the boat equipped with a floatage dress, each having a torpedo in a watertight box connected with a slight-made rope. By swimming at right angles to the current they would take position on each side of the gunboat, and in a few seconds' drift with the current the center of the connecting rope would have caught on the anchor chain or bow of the boat, it being buoyed for the purpose. When the men, in floating down, found the rope caught they simply let go of the float torpedoes, and in a few seconds they would be in contact with the vessel to be destroyed. A slow time-fuse or clockwork did the rest of the work. In the mean time the men floated out of reach, to be picked up by men detailed for the purpose.

The scheme fell through (much to the satisfaction of my conscience now) from want of the means to make the torpedoes. I proved the details of application to be practicable by actual trial on a boat on Red River.

J. T. HOGANE.

Texarkana, Ark., May 22, 1885.

Improved Machinery for Making Twine and Cordage.

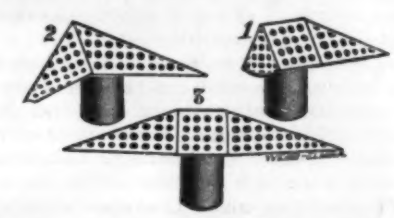
A private exhibition of Mr. John Good's new machinery and process for making twine and cordage, recently given in Brooklyn, brought together the principal rope manufacturers of both Great Britain and America. The distinctive features of Mr. Good's machinery are its admirable compactness, saving three-fourths in factory room, and the construction by which it twists both yarn and finished strand at one operation and in the same direction. Formerly the twisted yarn often lost almost its entire twist while being formed into strands. By this simple expedient, Mr. Good's process produces, with the same quality and weight of fiber, a rope 50 per cent stronger than that made by the old process.

Clean Cellars Necessary for Healthy Homes.

In city and country alike, it is the dark corners, the neglected and little used places in a house, which most frequently contribute to its unhealthfulness, and in ways which are the more insidious because so often unsuspected. In this respect the cellars of many houses have much to answer for, for they are generally dark and damp, with no direct rays of the sun to kill the mephitic gases which always seek those low levels, and no ventilation to disperse them, even where the cellars themselves are not made the depositories of cast-off rubbish and vegetable refuse. Therefore the warning cannot be too often given, especially in the spring, when so many families move into new houses, and when the good housewife generally enforces the most thorough cleaning and overhauling of the year, to look to it that the cellar is not neglected. Their ceilings and walls should be plastered and whitewashed or calcimined where possible, to keep them dry and clean, and the occupants should prevent their cellars above all things else from becoming "poke holes" for rubbish; the floors should be well paved or cemented, to keep out emanations from the soil; and where this can be done, they should be ventilated by keeping open, in dry weather, windows or doors communicating with the outside air. Emanations from cellars do not kill in a night; they are but too frequently not noticed at all, although damp and mouldy cellars have undoubtedly done much to undermine the health of many families. This cellar air is taken up through the rooms of a house gradually, and in small doses at a time, but the warmer air of the upper rooms produces an upward current every time the cellar door is opened, and neglect in regard to this matter is sure to entail serious consequences because the real reason is so often overlooked.

PROTECTOR FOR WATER CONDUCTORS.

The need of some protector to keep eave troughs and water conductors free from leaves, sticks, papers, birds' nests, and other substances, and prevent their clogging the pipes or dirtying the water, is well supplied by



the device shown in the engraving. The inventor, Mr. C. Muth, of Troy, Pa., has named it the "perfect protector," as he claims that that best describes its action in clearing the pipes while allowing entire freedom for the flow of water. It is simple in construction, and can be manufactured by any tinsmith or obtained from the patentee. The thousands of persons who have been put to unnecessary expense and annoyance by the clogging of conductor pipes will appreciate the merits of this device.

Helenina.—A New Antiseptic.

The *Lancet* states that some articles have appeared in recent numbers of the *Boletin Farmaceutico*, of Barcelona, calling attention to a drug which seems to be well known in Spain, but which, not having been in the writer's opinion prescribed with due regard to its physiological properties, has disappointed many, and so has fallen into undeserved disrepute. The drug referred to is helenina, the active principle of Inula helenium (elecampane). It was formerly used for itch and herpes, also as an anthelmintic. It has now been found to have powerful antiseptic properties. Dr. Korab found that fifty centigrammes were sufficient to entirely arrest putrefaction in five liters of urine—*i. e.*, 1 in 10,000 parts. The writer of the articles has also made some experiments. A slice of veal sprinkled with a solution of 25 centigrammes of helenina in 2 grammes of alcohol, and kept at a temperature of 28° C., remained perfectly sweet for ten days, by which time it was completely dried up.

An egg beaten up with 300 grammes of water, to which was added 30 centigrammes (about five grains) of helenina dissolved in two grammes of alcohol, remained unchanged at the temperature of 28° C. for six days. Another egg similarly beaten-up without the drug, and kept at the temperature mentioned, rapidly decomposed, and in twenty hours emitted a strong odor of sulphide of hydrogen; to this a solution of 50 centigrammes of helenina was added, and in a few minutes the offensive odor had disappeared, and the mixture underwent no further change. Similar experiments with urine, meat, and beaten up eggs were made with carbolic acid, boracic acid, and salicylic acid, instead of helenina; but much larger proportions of these substances were required to prevent putrefaction, and none of them were capable of arresting commencing putrefaction of the egg, as helenina had done.

Korab found that a few drops of a solution of helenina immediately killed the organisms in ordinary infusions, and also in cultivations of the tubercle bacillus. While the writer was working with helenina in his laboratory, he noticed that the bad odors usually present in the vicinity were replaced by the aromatic smell of the drug, due to the washings thrown away. He also noticed that insects, which were commonly very numerous, were at that time absent; even the mosquitoes were kept away from the whole house during the months in which they specially abound. The drug has proved most valuable in surgery as an antiseptic when carbolic acid and other agents had failed. It has been successfully given internally in malarial fevers, tubercular, infantile, and catarrhal diarrhœa; and it is expected to prove an excellent substitute for carbolic acid in the Listerian system of aseptic surgery. The dose is about a third of a grain in pill or mucilage, and the price about a penny a grain.

DECISIONS RELATING TO PATENTS.

U. S. Circuit Court.—Southern District of New York.

TOMKINSON *v.* THE WILLETS MANUFACTURING COMPANY.

DESIGN PATENT FOR A VEGETABLE DISH.

Coxe, J.:

It is not necessary that the design patented should be copied in every particular to constitute it an infringement. It is enough that it has the same general appearance, if the variations are slight, and to the eye of an ordinary person the two things are substantially similar.

If the resemblance is such that a purchaser would be deceived, it will not aid the infringer to show that he has deviated slightly in details, or has omitted something which an expert can discover.

Decree for the complainant.

U. S. Circuit Court.—Northern District of New York.

VACUUM OIL COMPANY *v.* BUFFALO LUBRICATING OIL COMPANY.

APPARATUS FOR DISTILLING PETROLEUM.

Wallace, J.:

The second and twelfth claim of letters patent No. 68,426, granted Sept. 3, 1867, to Hiram B. Everest, for an improvement in apparatus for distilling petroleum, declared void for want of novelty.

A disclaimer cannot be filed after the expiration of the term of a patent.

Preservation of Coal.

It is reported that a method for preserving coal from deterioration in store has been applied with considerable success by Herr Wenzel Poech, of Karbitz, Austria. He argues that if coal is placed in an atmosphere of steam, which excludes air from permeating the mass, the hygroscopic moisture will have no tendency to leave the coal, nor can any chemical action set in, even in presence of pyrites, the oxidation of which is, in other circumstances, promoted by moisture. According to this view, any method by which air could be excluded from coal at the same time that it is kept damp, would prevent its alteration or spontaneous combustion. Generally the most convenient procedure upon this principle is to admit into the heap of coal to be preserved exhaust steam from an engine. For this purpose the site of the heap is prepared beforehand by cutting trenches in the ground, at about the same distances as the intended height of the heap; crossing at right angles so as to divide the area equally.

Upon these trenches loose boards (or, better still, any form of rough gratings permitting the passage of steam without allowing the coal to fall through) are placed, and the coal is then heaped in the usual way. The exhaust steam is afterward admitted into the trenches, and allowed to find its way through the mass. When the coal is stored in the open, it is advisable to cover it with fine coal or cinders, as with charcoal heaps, to prevent the steam escaping by channels, and also to prevent draughts of air. This covering is the more important with coals rich in pyrites; with some coal it may be dispensed with. In this way a coal which generally deteriorates rapidly with exposure may be stored for months without suffering alteration. At some of the Austrian mines the process is applied on a large scale. Confirmation of the practice was obtained accidentally at one pit where a heap of coal happened to be formed over an old tank into which exhaust steam found its way. When this coal was reloaded, it was found in unimpaired condition, while coal stored beside it showed unmistakable signs of weathering.

Norwegium.

This is the name given to another new metal, which is now added to our rapidly growing list of elements. It was discovered by Dr. T. Dahll in examining a specimen of nickel ore from Kragero, in Norway. It is a malleable metal, of white color, with a tinge of brown; it presents, when pure, a metallic luster, but, on exposure to the atmosphere, becomes coated with a thin film of oxide; its hardness is about that of copper, and its specific gravity is 9·4441. At 350° C., it melts. From its physical properties and chemical reaction, it appears to differ from every other known metal, and Dr. Dahll claims for it a distinct individuality.

Accidental Explosions by Non-Explosive Liquids.

In discussing the origin of "accidental" explosions in oil lamps, Sir Frederick Abel, in a recent lecture before the Royal Institution, gave it as his opinion that if the lamp of which the reservoir is partly full of oil be carried or rapidly moved from one place to another so as to agitate the liquid, a mixture of vapor and air may make its escape from the lamp in close vicinity to the flame, and, by becoming ignited, determine the explosion of the mixture existing in the reservoir. This escape may occur through the burner itself if the wick does not fit the holder properly, or through openings which exist in some lamps in the metal work, close to the burner, of sufficient size to allow flame to pass them readily.

A sudden cooling of the lamp, by its exposure to a draught or by its being blown upon, may give rise to an inrush of air, thereby increasing the explosive properties of the mixture with a little air contained in the reservoir, and the flame of the lamp may at the same time be drawn or forced into the air space filled with that mixture, especially if the flame has been turned down, as the latter is thus brought nearer to the reservoir. The sudden cooling of the glass, if it has become heated by the burning of the lamp, may also cause it to crack if it is not well annealed, and this cracking or fracture, which may allow the oil to escape, may convey the idea that an explosion has taken place. If the evidently common practice is resorted to of blowing down the chimney with a view of extinguishing the lamp, the effects above indicated as producible by a sudden cooling may be combined with the sudden forcing of the flame into the air space, and an explosion is thus pretty certain to ensue, especially if that air space is considerable.

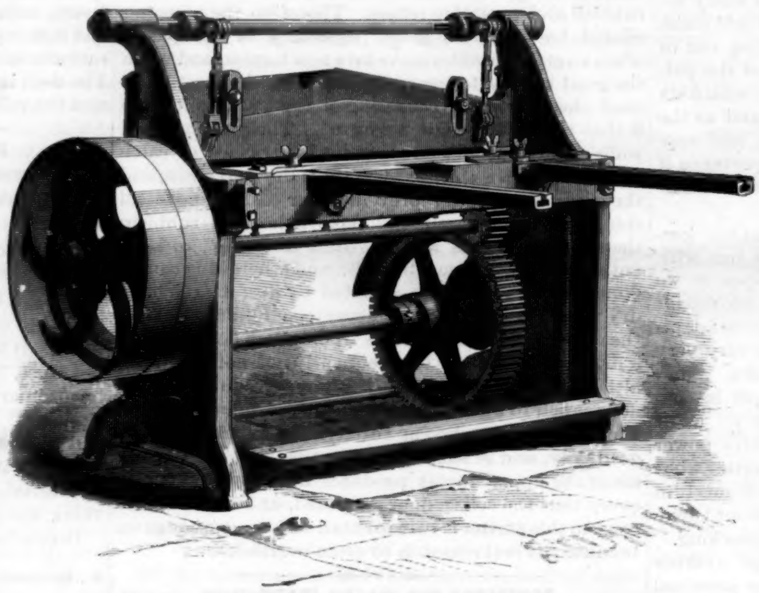
If the flashing point of the oil used be below the minimum (73° Abel) fixed by law, and even if it be about that point or a little above it, vapor will be given off comparatively freely if the oil in the lamp be agitated by carrying the latter or moving it carelessly; the escape of a mixture of vapor with a little air from the lamp, and its ignition, will take place more readily, but, on the other hand, it will probably be feebly explosive, because the air will have been expelled in great measure by the generation of petroleum vapor. If the flashing point of the oil be high, the vapor will be less readily or copiously produced, under the conditions above indicated, but as a natural consequence the mixture of vapor and air existing in the lamp may be more violently explosive, because the proportion of the former to the latter is likely to be lower and nearer that demanded for the production of a powerfully explosive mixture.

If the quantity of oil in the lamp reservoir be but small, and the air space consequently large, the ignition of the explosive vapor will produce more violent effects than if the air space be small by the lamp being full. If the wick be lowered very much, or if for some other reason the flame becomes very low, so that it is burning beneath the metal work which projects over the wick holder, the lamp will become much heated at those parts, and more explosive gas generated, while the glass will become heated, and therefore more sensible to draughts. Oils of high flashing point are more liable to heating than light volatile oils, hence safety in the use of oils is not entirely secured by employing oils of high flashing point (or low volatility), and the use of very heavy oils may even give rise to dangers which are small, if not entirely absent, with oils of comparatively low flashing points. The chief conclusions arrived at by Sir Frederick Abel are that it is desirable the reservoir of the lamp should be of metal. There should be no opening or feeding place in the reservoir, nor should there be any opening or channel of communication to the reservoir at or near the burner, unless protected by fine wire gauze, or packed with wire, or unless it is of a diameter not exceeding 0·04 in.

The wick used should be of a soft texture and loosely plaited. It should fill the entire space of the wick holder, and should not be so broad as to be compressed within the latter. It should be dried before the fire when required for use. The fresh wick or wicks should be but little longer than sufficient to reach the bottom of the reservoir, and should never be immersed to a less depth than about one-third the total depth of the reservoir. The reservoir should always be almost filled before use. The flame should be lowered very carefully so that it does not go below the metal work more than is necessary; but even then the combustion of the oil will be imperfect and the lamp unpleasant. When the light has to be extinguished, and is not provided with a special extinguisher, the flame should be lowered until there is only a flicker. The mouth should then be brought to a level with the top of the chimney, and a sharp puff of breath projected across the opening.

POWER SHEARS FOR CUTTING SHEET METAL.

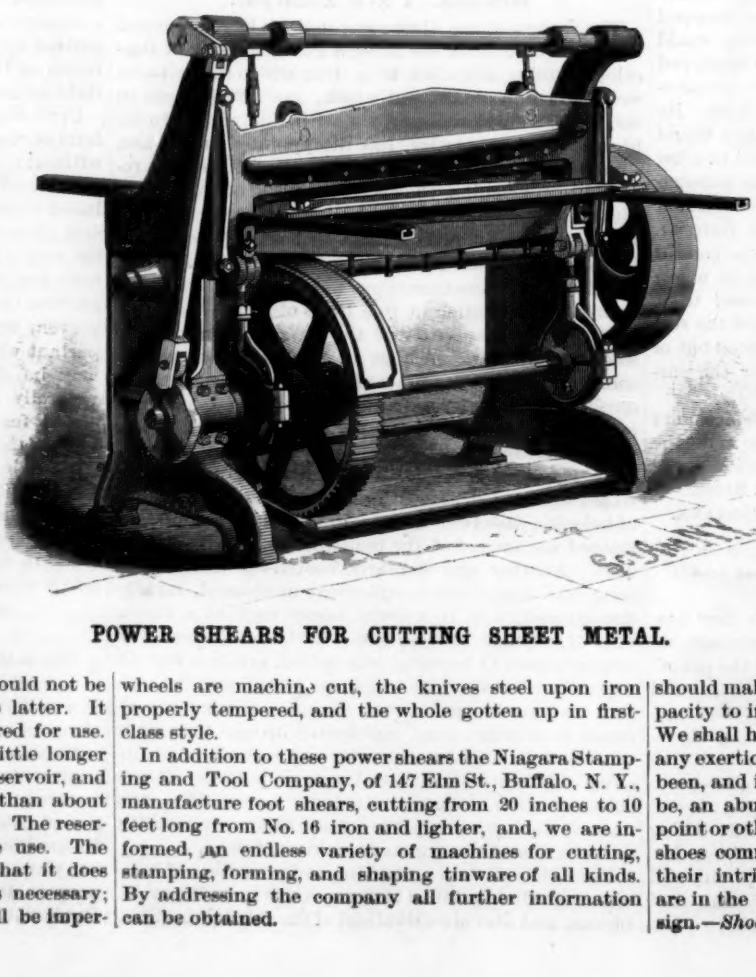
We herewith present engravings of power shears designed for cutting sheet metal of No. 10 gauge and lighter. These shears are made in lengths varying from 42 inches to 10 feet, and either plain or with back gear; and they have, as will be seen by the cuts, several novel and peculiar features.



POWER SHEARS FOR CUTTING SHEET METAL.

The table is supported on strong solid legs, having the bearings for the main and counter shafts. The former carries two eccentrics, connected with the crosshead carrying the upper knife by means of swivel connections, and the spur wheel having a clutch mechanism, by means of which the shear is started and automatically stopped as soon as it has made one revolution. Into the spur wheel meshes a pinion on the countershaft, motion being given to this shaft by the two pulleys shown, one of which has a very heavy rim to serve as a fly or balance wheel. In front of the upper knife is an automatically acting clamping device, operated by means of the cam shown on the end of the main shaft. This clamp secures the sheet to be cut firmly upon the table to prevent "draw cutting," which is well understood to interfere with the proper cutting.

All the shafts on the shears are of steel, the gear wheels are machine cut, the knives steel upon iron properly tempered, and the whole gotten up in first-class style.



POWER SHEARS FOR CUTTING SHEET METAL.

In addition to these power shears the Niagara Stamping and Tool Company, of 147 Elm St., Buffalo, N. Y., manufacture foot shears, cutting from 20 inches to 10 feet long from No. 16 iron and lighter, and, we are informed, an endless variety of machines for cutting, stamping, forming, and shaping tinware of all kinds. By addressing the company all further information can be obtained.

Liquid Fuel for Ships.

The question of displacing coal by liquid fuel for marine purposes is a subject which has been much neglected in this country, although of great importance. The matter was brought to the notice of the Royal United Service Institution in a paper read on May 8, by Admiral J. H. Selwyn. It is one with which the lecturer is well acquainted. Twenty years ago he drew attention to the enormous value of liquid fuel for the royal and mercantile marines, and since then he has had the mortification of seeing the subject overlooked in England, and taken up by other nations, especially by Russia. According to the lecturer, by the use of liquid fuel a vessel can carry twice as much power of propulsion as a vessel with coal; and the disadvantages which would arise to British vessels in having to meet opponents which could use double powers in escaping without the aid of resorting to a fuel station are apparent. Admiral Selwyn's object is to enforce greater economy of fuel, which can be effected, he says, without any of that large expenditure often a necessary concomitant of radical changes. To burn liquid fuel instead of coal requires no change in engines or boilers, and only such adaptation of the furnaces as can be readily carried out in each ship by her own artificers and engineers. At the same time, it removes the necessity for a whole army of stokers and coal trimmers. It enables a ship to receive her fuel with the greatest facility at sea or in harbor, while proceeding under steam or even sail, is without nuisances of dust or ashes, and is not liable either to spontaneous combustion or deterioration by time, heat, or moisture. If the ship gets on shore, the fuel can be run out to lighten her, or pumped out into lighters with a speed and facility unapproachable with coal; and, lastly, if, as the Admiral believes, 46 pounds of water can be evaporated with one pound of fuel, full steaming for twenty-four days can be carried on where now it is limited to four. Thus each ship would be six times as effective as now. It seems inconceivable how a nation like the British should have allowed this matter to remain dormant till another power took it up. The author pointed out the annual vote for the navy amounts to about eighteen millions, of which six millions are devoted to the ships and their crews. If each ship were made twice as efficient—that is to say, could remain on her station twice as long as before by reason of a change in her fuel which gave her that power—this might be considered as affecting the value of the whole fleet to the extent of twelve millions per annum. We agree with the Admiral that the subject is one which deserves serious consideration; but we are unable to follow him in his figures. He seems to have forgotten the fact that the demand which would arise for the commodity in the event of liquid fuel being adopted for steamers would send up its price at once, as it has done on previous occasions when the demand has appeared imminent, and hence his calculations as to cost and effect would be at once upset.—*Iron.*

Sham Shoes.

To save the outlay of four cents a pair on shoes, a manufacturer will substitute four different kinds of sham for genuine material, to wit, a cloth lining, a paper insole, a buffalo outsole, and a pasteboard stiffening. A salesman proposed to cheapen goods a dollar or so per case, in such a way that buyers "won't know the difference." It stands to reason that the difference in cost between the best shoe and the worst must be very much less than the difference in quality. It takes about as much labor to make one as the other—not such a degree of skill to be sure, but the clumsy workman is apt to be slow; as for the leather and trimmings, it isn't so very much more expensive to supply the finest than the coarsest; a dime or two a pair will cover the odds. Now, under these circumstances, it is difficult to comprehend why anybody should make an inferior shoe, unless it is from incapacity to improve upon it. There is no economy in it. We shall have common shoes enough without making any exertion to increase the number. There always has been, and it feared there will continue for some time to be, an abundance of stock which is defective in some point or other. But the fact that the poorest quality of shoes command the best prices, proportionately to their intrinsic value, shows that the superior kinds are in the largest supply, which is an exceedingly good sign.—*Shoe and Leather Reporter.*

THE WHITE-NOSED MONKEY AT THE BERLIN AQUARIUM.

The large apes, such as the gorilla, chimpanzee, orang-outang, and gibbon, are interesting more on account of the size of their bodies, and are of special value for geologists and scientists; but they do not belong to the class of popular apes, such as the smaller monkeys from the northern part of Africa; those especially accompanying the Italian organ-grinders, mountebanks, etc. It will also be observed that in zoological gardens the cages containing the smaller monkeys form the greatest attraction for children. These monkeys are of the genus *Cercopithecus*. The annexed cut, taken from the *Illustrirte Zeitung*, shows the white-nosed monkey, *Cercopithecus martini*, in the Berlin Aquarium. These animals are very rare, and this is the first that has been exhibited at Berlin.

Its fur is grayish-brown, and very fine. The face is smooth, eyes brown, the ears black and without hair, and the upper and lower lips are covered with a fine, soft mustache and whiskers. The hands are hairless, and have very long fingers. The little fingers on the hind legs have sharp claws, but otherwise the animal is the same as other small monkeys, with the exception of its nose, which is absolutely white. It is covered with short, shiny white hair, but only the projecting part is white, the division line being almost mathematically exact. The white nose gives the monkey a very peculiar appearance, resembling that of a circus clown. At the first sight of the monkey it seems as if some one had played a practical joke and painted its nose, but an examination will prove that it is as real as the blue cheeks of the mandril.

When this monkey was first placed in the cage with the other monkeys they were much astonished, followed him around, and could not be quieted until one of them had examined the nose very carefully and convinced himself that it was real. They would not associate with him for a long time, nor would they eat from the same dish. The *Cercopithecus martini*, or white-nosed monkey, is very amusing, and becomes very much attached to man. During the trip from the western coast of Africa to Hamburg, he was the pet of the sailors; and he is now a great favorite in the Berlin Aquarium.

THE WHITE NOSED MONKEY.—BERLIN AQUARIUM.

Amount of Exercise Required.

Dr. Parkes has calculated that the amount of exercise a man in health should take regularly is equal to walking nine miles a day upon level ground. The amount of walking done in walking about the house and other domestic duties may probably be put down as three miles, which will leave only a walk of six miles per diem on level ground. If the ground is hilly, this will be still more reduced, so that it certainly does not seem an excessive amount to advise. The proper quantity must, however, vary greatly with circumstances. Females, for example, will not take as much as men. In winter more may be taken than in summer. In youth, when the body is undergoing its most active development, care must be taken that every muscle is exercised in its turn. Hence the free use of gymnastics, games, and sports at this age is most beneficial. In advanced life the power and inclination for exercise both fail, but even then every effort should be made to prevail upon the individual to take some amount of exercise, and to postpone the evil day when he will become completely bedridden. Such an amount of exercise is in all cases necessary as will keep the muscles in good health, and enable them to meet the physical requirements of the rest of the body.

China Grass.

The following is an extract from a recent report by M. Lemaire, Consul-General for France:

Production.—China grass, in Chinese "sow-mo," is cultivated in the southern and central provinces of China, viz., Honan, Shantung, Hupeh, and the environs of Hon Kin. This plant grows like brush wood; its branches attain the length of three to four yards, it thrives particularly well on rich ground, and its cultivation needs little attention.

Preparation.—The young branches or boughs of the plant are generally cut three times; these cuts are made in the 4th, 7th, and 9th Chinese moons of each year. The first is regarded as the most important, the second less, and the third least. The bark of the young branches, after having been kept a certain time in water, is beaten and scraped in order to get rid of its outer cover and its inner pitch; it is afterward flattened and dried. After this operation, which is a very long one and demands great attention, a fibrous product, which is utilized for the manufacture of a tissue known among the Chinese un'er the name of "chia-pow," is obtained.

Spinning.—The above product, which has the brilliancy of silk, is then given to women, who spin it, ordinarily by hand. It is only very rarely that this texture is spun on the spinning wheel and the spindle like cotton.

Weaving.—When the skeins are ready, the Chinese weave and work them with the primitive means at their command. The beauty and uniformity of the articles they obtain is astonishing; some toothed combs driven into the ground in the open air and a piece of rough wood to separate the warps from the looms. The warp having been fixed, two females, one standing at each side, throw the shuttle. The weft is simply beaten up by a few blows applied to it to press it against the preceding one, and this is the whole operation. The width of the pieces is uniform, about 18 inches; their length is from 30 to 35 feet.

Dyeing.—Finally the pieces go to the dye house, where they are dyed red, blue, or black, which are the only colors employed for this class of goods. These colors are not fast, that is to say, the blue grows paler and the black redder by washing. The blue is obtained from the Chinese indigo; the pieces to be dyed light blue receive two baths, and those to be dyed dark blue four. The red coloring matter is derived from the woods of the islands, called the woods of St. Mary. As for the black, the material first receives five baths of blue, afterward it is plunged into the black coloring matter as many times as is necessary to obtain the desired tint. The Chinese obtain their black coloring matter from three ingredients, whose names, prices, and proportions are as follows: 1. Gallnut, in Chinese "pe-ts;" price 1s. 8d. per pound, one part. 2. Protosulphuret of iron, improperly called by the Chinese green alum, "tsin-fin;" price 1s. 2d. per pound, two parts. 3. Fruit of a Chinese plant, "houa-kow;" price 2d. per pound, four parts. These ingredients are placed in a large boiler, into which about twenty times their weight of water is poured; they are boiled until the protosulphuret of iron is dissolved: the degree of strength of the color is determined from time to time by soaking a piece of white material in it. The baths being ready, they are used hot or cold indiscriminately. The pieces of cloth are dried before receiving a new bath. The pieces are finally dried in the open air, then stretched by two men, who before this operation shake them in the wind. They are afterward folded and ready for sale. The sale of the bark and the fiber does not take place on the spot, because the cultivators of the plant sell it themselves, so that the tissue only appears in the market in the piece.

Chinese Rice Pan Casting.

As a notable example of the patient, plodding industry shown by the Chinese, may be instanced the manufacture of the very thin cast-iron rice pans which may be seen in any cook-house in Hong Kong. The principal seats of this industry are at the towns of Sam-tiu-chuk and Fatshan. The iron used is obtained by smelting magnetic oxide. The ore is broken up and smelted with charcoal in a very primitive smelting furnace, some eight feet high. The cupola is cone-shaped, having its apex at the bottom. The single tuyere pipe is of earthenware, the opening for the emission of the blast being inclined downward. The furnace itself is of earthenware, strengthened by hoops and longitudinal straps of iron. The whole is lined with clay several inches thick. The internal diameter at the bottom is about two feet, and at the top three feet and a half; the inside depth being about six feet. The blast is produced by a rude bellows, formed of a wooden box five feet long by three in horizontal and a foot and a half in vertical section. This box is divided longitudinally into two compartments, each eighteen inches square in vertical section. In each of these compartments a piston works, the valves being so arranged that one piston is effective in the up, and the other in the down or return stroke. As there is no air chamber, the blast is not perfectly continuous. The fuel used is charcoal; and the furnace, being first heated by starting a fire with fuel alone, is then filled up with alternate layers of charcoal and ore in small fragments. The blast is urged, and, after a sufficient time has elapsed, the molten metal is drawn off from a tap hole at the bottom and cast into ingots. These, when intended for export, are afterward reheated in an open forge.

For making the very thin rice pans, which are cast without handles, pure iron of native manufacture alone is used. The moulds in which the pans are cast require weeks of tedious and patient labor to bring them to perfection. They are composed of two parts, an upper and a lower, and are made of carefully puddled clay. The great secret of the process which enables the Chinese founders to cast their iron pans of such large diameter, yet so thin and light as to be scarcely thicker than a sheet of paper, appears to be the use of highly heated moulds and pure charcoal pig iron. When the ovens and their contents have cooled down, which takes about two days, the luting attaching the upper portion of the mould to the lower is carefully removed, and, the moulds being separated, the pan can be extracted. When the operation is successful, the same mould can be used several times. The pans now have each attached to its bottom a lump of iron, which, from the extreme brittleness of the pans, requires the greatest care in its removal. These runners are carefully sawn off, and the edges smoothed down; the pan is then ready for the export market. Handles are attached to these pans by the retail dealers.

The pans made at Fatshan differ from the preceding in being cast with handles attached near the rim to the inner surface of the pan, which necessitates the breaking of the mould at each casting. They are usually cast much thicker and heavier than those of Sam-tiu-chuk, and occasionally one-third of foreign pig iron is mixed with the native iron for casting. In other respects the process followed at both places is the same.—*Journal Iron and Steel Institute.*

Never Heard From.

The Magenta was a very fine new steamer, built of steel according to Lloyd's rules, well equipped, well found, and all recent improvements adopted to facilitate her carrying out the work for which she was built, viz., cable repairing, being, we believe, the last addition to the fleet of steamers belonging to the Eastern extension, Australasia and China Telegraph Company, specially designed for cable work. She left the Thames early in March (on her maiden voyage) *en route* for Singapore, and has not been sighted or heard of since she left the channel, one of her small boats having been picked up about 200 miles off Cape Finisterre. The unsinkable ship remains still to be invented. Everything about a vessel has been greatly improved, but the art of keeping afloat is yet in its infancy.

Improvements in Milling Machinery Still Possible.

To the casual observer it would appear that further advance toward perfection in milling machinery and processes was almost impossible. Is this the case? Let us briefly consider the matter.

The introduction of the middlings purifier was the beginning of a series of decided and radical changes in processes of flour manufacture. The introduction of the roller mill marked another series of changes, and this has been followed by the centrifugal reel, which is more slowly, but, apparently, none the less surely, marking another series of changes. These are practically all the machines which, in nature, are radically different from those in use fifteen years ago, and it is to the introduction of these machines that manufacturers are indebted for the remarkable prosperity which has followed them in recent years.

It may be at once, and with comparative safety, admitted that the middlings purifier, the roller mill, and the centrifugal reel have now reached such a degree of perfection in construction and operation that, except in minor details, little improvement may be, for some time to come, anticipated; but the separator, the smut machine, the brush machine, the elevator, the conveyer, and the flour packer remain in nearly the same condition as fifteen or more years ago. Mark, we do not say that in construction or operation these devices are in any manner lacking. By no means. We simply say that no radical changes have been made in them, and herein lies one opportunity for the restless and always sanguine inventor. Take, if you please, the cockle machine. There is but one in the entire country. It is a successful and satisfactorily operating machine, but is it not possible to devise something radically different in construction and principle which shall give as satisfactory results? Many efforts have been made to equal this machine, but all have so far been failures, but the fact still remains that "there is more than one way to skin a cat," and we haven't the slightest doubt that he who shall devise a machine which shall excel in performance the operation of the present well known and excellent machine will have no difficulty in making satisfactory arrangements for putting it on the market. We instance the cockle machine because inventive talent appears to be inadequate to the task of solving the problem satisfactorily.

Take the smut machine, the brush machine, or the flour packer; each and all work well and satisfactorily, but so did the millstone a few years since. It may be impossible to substitute for them other devices so radically different in form as is the roller mill from the millstone, or the centrifugal from the hexagonal reel, still any change in form, or principle of action, which shall increase the efficiency of their operation, or decrease the cost of construction without impairing their durability, will find liberal reward.

We hear much in these days of systems, yet systems are almost as numerous as men. While we have systems innumerable, we have no system. That's a strong assertion, and perhaps it should be qualified by saying that no system yet devised has achieved the distinction of recognition as the best. Perhaps such recognition will never be extended, but surely it is possible to approach more nearly to simplicity in caring for and handling the different products than now prevails. At any rate, the matter is worthy of more study than has hitherto been accorded it.

Every one of our readers remembers how great a figure the "separations" cut in the expert miller's vocabulary a few years ago. Not one of them but could sit down at a beer table, and sketch out on a piece of paper the correct manner of handling the material. If talk would do the business, there it was all done. The remarkable thing, however, was that these same experts, or the majority of them, when put into the mill were compelled to adopt the "cut and try" plan many times before satisfactory results were even approximated. This simply went to demonstrate that theories may easily be built without foundation. Successfully operating systems, as before said, have been devised, and perhaps they are as nearly perfect in conception as they can be with present mechanisms, but we do not yet know this. There is ample scope for study and experiment, and these, intelligently directed, may result in practical revolution. It will be conceded that the conversion of wheat into flour involves delicate manipulations, and, under varying conditions, changes in treatment and handling, and it may, perhaps, be impossible to reduce this conversion to prescribed and fixed *modus operandi*, but is it not possible to materially simplify operations while still retaining the high standards of quality and yield?

It will not be sufficient to achieve results simply in manner different from those already in vogue. We may peel an apple in various ways, yet it will advantage us nothing unless our particular way permits of its being more quickly peeled, or more evenly peeled, or in some other point where time—which is money—is saved without loss in the process of peeling.

The middlings purifier achieved its success largely because it was a new aggregation of mechanical principles, by which a new operation was performed and an advantage gained. The roller mill and the centrifugal reel combined the same advantages, and achieved similar success. We might mention also the dust collector, the final outcome of a long series of experiments, but radically different from the original device aimed at. Its success has been almost phenomenal, and it is recognized now as a necessary adjunct of every mill. It cannot be termed an improvement, as it is a new device, as was the purifier, the roller mill, and the centrifugal reel. Improvements upon old mechanisms and devices, while many times of great value, do not inaugurate revolutions, and therefore do not mark epochs of progress. Radical changes should be the aim of the inventor who would be successful, and there is still ample room in the milling field for the exercise of his genius and talents. Map out some new departure; endeavor to apply some new principle; aim at simplicity of construction and perfection of operation; and if your efforts meet with success, there will remain little doubt of your having full reward. Don't imitate. The number of real inventors can be easily counted; the imitators are innumerable.—*The Milling World.*

Some New Corn Cures.

Every dog has his day, and the particular dog that is flourishing at present in the matter of corn cures is the solution in collodion of salicylic acid and extract of Cannabis indica. This is a very successful preparation, but some people cannot be bothered with brushing on a paint every now and again; they want something that will give less trouble. It is only too true that no corn cure is really permanent in its effect; we ourselves have realized this to our sorrow; and when a customer has exhausted the contents of a bottle, he cheerfully resigns himself to the prospect of another, and probably at last the effectual remedy thus falls a victim to the first advertisement he sees.

Hope springs eternal in the human breast,
Man never is, but always to be blest;

and we may say as truly—

Corns never are, but always to be, cured;

and therefore our *clientele* are ever ready, nay, eager, to try some new thing. Surely it ought to be our endeavor to do our utmost toward satisfying, not to speak of stimulating, this most natural craving!

Salicylic plaster has recently been put on the market as a cure for corns, bunions, and thickened skins generally. The price is reasonable enough, but some may prefer to make it for themselves. This any chemist can easily do with every satisfaction both to himself and his customers. Dissolve 2 drachms each of salicylic and common yellow resin in 6 drachms of sulphuric ether, and paint the solution over belladonna or opium plaster spread on swansdown. The pigment dries almost instantaneously, and the plaster is then ready for cutting up into suitable sizes for corns. Considering that the whole does not cost more three or four shillings per yard, and that several thousand plasters may be made out of that quantity, it is evident that by retailing at two or three a penny a profit will be made such as would be envied even in Regent Street.

Some corns are so painful that neither paint nor plaster can be endured, something of the nature of a shield alone giving relief. For such cases as these the following wrinkle may be appreciated: Take a corn shield, enlarge the diameter of the hole to a small extent by means of a knife or scissors, and apply in the usual way. Then place in the hollow thus formed over the corn a small quantity of any of the following solutions: Salicylic acid and ext. Cannabis ind. dissolved in ether, or ext. Cannabis indica ½ drachm, dissolved in 2 drachms of liquor potassæ, or a saturated solution of iodine or iodide of potash in strong alcohol. The shield does the double service of taking the pressure of the boot off the corn, and at the same time preventing the liquid being rubbed off by the sock, while all of these solutions penetrate the skin much more rapidly than the usual collodion preparation, and are consequently much more effective in their operation.

The saturated solution of iodine often succeeds in removing corns and indurated epidermis when other remedies have failed, and the well known solvent action of liquor potassæ is a sufficient credential to induce for it at least a trial.

Other new corn cures are being brought out, but reference to these at present would only be of the nature of a surfeit. The hints already thrown out should be sufficient to enable any pushing chemist to make himself name and fame in his own district in the matter of curing corns.—*The Chemist and Druggist* (*London*).

Failure of the Cable Road in Philadelphia.

The road is constructed through 12 miles of the principal streets of the city, and has cost the projectors $600,000, but it is estimated that $1,250,000 more will be required to correct mistakes. When the iron conduits through which the cable passes were laid, iron rods were run through the stringers and bolted to the top of the conduits just below the slot where the grip passes down to the cable under the street. Every change of temperature has been found to affect the width of the slot and hinder the passage of the grip.

Rapid Building of Steamboats.

John Elder & Co., Glasgow, have just completed an important contract for sternwheel steamers for service on the Nile. The first contract, signed the 9th of March, was for one vessel, named the Ibis, measuring 120 feet by 23 feet broad, and 138 feet over all. This vessel was ready for trial three weeks before the day fixed for the delivery. Designed to draw only 2 feet of water, and to steam at the rate of 12 statute miles per hour, the Ibis was built of steel plates just under ⅛ inch in thickness, and furnished with a surface condensing compound engine and a locomotive boiler capable of working at a pressure of 160 pounds per square inch, the power being transmitted to a large paddle wheel suspended from the stern of the vessel on strong steel girders. She is fit to steam right up the Nile to Khartoum. On the 10th of March the second contract was entered into by the War Office with Elder & Co., which was for ten other vessels. They were to have their draught limited to 2 feet, and to have a similar speed; and the special design in the case of these stern wheelers was that they should be serviceable for towing barges of stores, three at a time, up the Nile—one on each side, and one pushed in front, the existence of a stern paddle wheel rendering towage in the rear very difficult. Measuring 81 feet long by 20 feet broad, and 95 feet over all, these vessels were to be made of four pontoons each, capable of being taken to pieces, and fitted together on the Nile. The other contract was entered into with the Fairfield firm by Sir R. Lloyd Lindsay, on behalf of the National Aid Society. It was for a somewhat similar vessel, one measuring 90 feet long by 18 feet broad, and 105 feet over all, to be built, not in pontoons, but with a continuous skin, capable of being taken on board a ship in sections for purposes of transport, and to be finally put together on the Nile.

All the ten vessels of the second contract were completed on the 16th of April, or within thirty-four working days from the date of signing the contract; and the National Aid Society's vessel was completed and working within twenty days of the signing of the contract in London. The contract for the transport of the little steamers to Egypt was also undertaken by Elder & Co., who placed at the disposal of the Government for the purpose the steamship Parthia, formerly of the Cunard Line, but now the property of the Fairfied firm. All her internal fittings having been removed, the whole of the twelve vessels, including the engines and boilers, were shipped while she lay in Fairfield dock, and they are now on their way to Alexandria. Along with them there have been sent some fifty picked hands from Fairfield works to assist in the construction of the vessels, but they will be largely aided by the Government staff at present in Egypt, under the superintendence of Mr. John Carmichael, deputy manager of Fairfield shipyard, who is proceeding overland to complete arrangements for the discharge and reconstruction of the vessels on the arrival of the Parthia. They will be landed from that steamer at Alexandria, thence taken by rail to Cairo, where they will be rebuilt and launched on the Nile.

Much credit is due Messrs. Beardmore, of Parkhead Forge and Steel Works, for the speed with which they supplied the steel for these vessels. They received their orders by telegraph, and in a few hours the plates were being rolled, and a supply was delivered next morning. All the boats were in course of construction simultaneously in different parts of the shipyard, and day and night shifts of workmen were employed upon them, so as to insure the most rapid progress that was possible. The rapidity with which the boats grew under the hands of the workmen was a matter of great interest. No sooner were the frames in position than the plates, which had been accurately punched for the reception of the rivets, were upon the ground; and following, as it were, on the heels of the riveters, the painters were ready to put a finishing touch upon the job.

The boilers of these vessels are placed in the forward end on the main deck, and the two steam cylinders of the engines are placed one on each side of the stern, their diameters being respectively 12 inches and 22 inches, with piston stroke of 3 feet 6 inches; and the diameter of the paddle wheel is 12 feet.

The vessel constructed for the National Aid Society has upon its deck a large hospital capable of accommodating fifty patients. Suspended from the roof, there is provided, on what is called the Zavodovsky principle, a means of hanging the stretchers bearing the wounded without putting them to the pain of removal. This arrangement consists of a cable stretching from side to side, and supporting a strong wooden spar, from which depend broad straps looped at the ends. Their use is to receive the ends of the four handles of the stretcher. By this means accommodation may be provided for six rows of patients from end to end of the hospital, in two tiers of three abreast. The dispensary on this boat is placed on the upper deck, where are also provided a galley, accommodation for officers, and an ice making machine. Instead of windows in the hospital there are provided wire blinds, exceedingly fine in texture, to exclude the sand, which, as is well known, causes great inconvenience.

The Advantages of Tobacco.

Dr. Pareira states in his Materia Medica that he is "unacquainted with any well determined ill effects from the practice of smoking," and Christison speaks of it as a "luxury used all the world over without any bad effects having been clearly traced to it." In a letter of Dr. Parkes, author of "Parke's Manual of Practical Hygiene," in *Lancet*, page 384, 1880, he confesses that he has searched in vain for any satisfactory evidence of the harmful effects of tobacco, and that it was for this reason that its consideration was not given place in the work mentioned.

The fact has been pointed out that men are on the whole as healthy as women, while nine out of ten of the male population of the world use tobacco, and women as a rule abstain. In the learned professions, about one-half of the ministers are addicted to it in some form, likely three-fourths of all physicians, and nine-tenths of members of the legal fraternity.

In looking calmly at the tobacco question, there is one feature calculated to excite alarm, and that is the habit of chewing and smoking so widely practiced among boys. This, to young, growing boys, is unqualifiedly hurtful. They voluntarily endure the first disagreeable effects of the tobacco to acquire what they consider an accomplishment, the habit is finally confirmed, and with an entire ignorance of its powers, added to a tendency to immoderation, the growth and development is often seriously interfered with, and the worst results follow. They smoke and chew generally the worst tobacco, and to a degree which would positively be harmful with the majority of adults.

This matter should be corrected by proper action of our legislators, with whom the responsibility rests.

Smoking, when done at proper times, facilitates digestion. The sense of relief obtained by a cigar, after a heavy meal, is well known to smokers. Dyspepsia sometimes follows the discontinuance of tobacco, and is removed when the habit is resumed.

While the abuse of tobacco weakens the system and leads to emaciation, used intelligently it exerts a favorable influence upon nutrition.

Hammond, by observation upon himself, found a gain in weight with the use of tobacco. Fiske attributed an increase of twenty-four pounds in three months to tobacco. "Tobacco, when the food is sufficient to preserve the weight, increases it; when insufficient, and the body is losing, tobacco restrains the loss." (Hammond).

Boerhaave, of Holland, over two hundred years ago referred to tobacco as being antidotal to hunger. It seems that the power to undergo severe exertion and fatigue, either mental or physical, is aided by tobacco.

"Soldiers of all nations use it. It was a standing injunction of Napoleon that his troops should have tobacco, and it was of great advantage in the retreat from Moscow." (Fiske.) During our late war the soldier would be patient under very severe privations, if he but had a good supply of tobacco to smoke or chew, and when on picket duty would risk his life to strike a match for his pipe.

Situations of loneliness are always rendered more tolerable by tobacco, and it is the constant companion of those who lead lives of solitude, such as that of the herdsmen or ranchmen. A feeling of unrest or discontent, made up of ill defined longings, of imaginary disappointments, and unpleasant anticipations, commonly known as ennui, is responsible for much unhappiness. This unfortunate condition of mind is removed by the soothing influence of a cigar, and the moroseness and gloom are quickly dispelled. As much of everyday is filled up with care, our degree of comfort in this life will depend largely upon our ability to bear it uncomplainingly. That tobacco assists us to do this, that it enables us to look upon life more complacently, must be the conclusion of every one who has experienced its influence. That it enables us to toil with less fatigue, is equally true. The readiest writers generally use tobacco, and cannot accomplish the same amount of work in the same time without it, and those connected with newspaper and other literary work, who have often to write against time, find it of inestimable value.

Tobacco formerly enjoyed a deserved reputation as a medicinal agent, and was extensively used in scabies and other cutaneous disorders. It has been largely supplanted, however, in modern practice, by other remedies. The use of tobacco during a mercurial course decreases the risk of salivation, and cases of ptyalism have been reported cured by its employment. Before the discovery of chloroform, tobacco served a useful purpose in the hands of the surgeon in cases of strangulated hernia for obtaining complete relaxation. Tobacco constitutes a most valuable addition to the ordinary poultice in local painful affections. In two cases of carcinoma of the breast, by incorporating it in a local application, a marked advantage was noticed by the writer in the relief of pain. As an ingredient in asthmatics, cigarettes with belladona, stramonium, etc., it is entitled to share in the remedial effect.

The limited medicinal range of tobacco is unimportant in comparison with its social and psychical influences. Among its many beneficent powers it appears to allay worry and lighten toil. It is an aid to mental work, and a help to reflection and complacency. It promotes sociability, and in the words of one of its champions, "makes a man act more like a Samaritan."

While it is neither liked nor needed by animals, who loathe it, it seems to be required and craved by man, to whom its characteristic properties appear peculiarly grateful and often useful. It has repeatedly and unjustly been called a curse, but those who have written most of its baneful effects, as a rule have never used it.

Indeed, this comforting substance is so far removed from the idea of a curse, that it should not be forgotten when we recount the many blessings of mankind.—*Med. and Surg. Reporter.*

Our New Navy Guns.

The Ordnance Department of the Navy is making all possible effort to complete the batteries for the new cruisers by the time the vessels are ready to be put into commission. The clerical error in the last appropriation bill, which deprived the department of an appropriation for this purpose, will necessarily occasion some delay, but the majority of the guns can be completed in season. They consist of four 8 inch breech loaders, in half turrets, eight 6 inch and two 5 inch breech loaders, for the Chicago; one 6 inch breech loader for the Dolphin, and four 8 inch and six 6 inch each for the Boston and Atlanta. Of the twenty-one 6 inch hooped breech loading guns, five have been completed, six are being made under contract with the South Boston Iron Works, five with the West Point Iron Works, and five are being constructed by our own workmen at the Washington Navy Yard. The steel forgings for all these guns are made by the Midvale Steel Company of Philadelphia. Of the guns completed one has been tried, and is said to have stood a higher test than any similar gun ever manufactured. The designs for these guns, as well as all the others referred to in this article, were prepared by the Ordnance Bureau at the Navy Department. The weight of the 6 inch gun is 11,000 pounds. It is designed to carry a charge of 50 pounds and projectile of 100 pounds, initial velocity 2,000 f. s. Of the twelve 8 inch guns required, eight have been ordered, and are under construction. Four are being built at the Washington Navy Yard, and two each by the South Boston and West Point Iron Works.

The 8 inch weighs 27,000 pounds; weight of projectile, 250 pounds; weight of charge, 125 pounds; initial velocity, 2,000 f. s. In addition to those above mentioned, the two 5 inch guns for the Chicago and the two 10 inch guns for the Miantonomoh are being made at the Washington Navy Yard. The weight of the 5 inch 30 cal. is 5,800 pounds, charge 30 pounds, and projectile 60 pounds; initial velocity, 2,000 f. s. One of these guns will be of 26 cal., and will weigh 4,200 pounds. The 10 inch gun weighs 53,000 pounds; charge, 250 pounds; projectile, 500 pounds; initial velocity, 2,000 f. s. The tube for the 10½ inch gun will shortly be ordered. The tube for the 12 inch gun will not be contracted for until another appropriation has been made. The 10½ inch gun is designed to weigh 62,000 pounds; and will carry a projectile of 550 pounds, with a powder charge of 275 pounds. The 12 inch gun will weigh 44 tons; charge, 425 pounds; projectile, 850 pounds; initial velocity, 2,000 f. s. A 6 inch wire wound gun is being constructed as an experiment. Its weight is 10,500 pounds; weight of projectile, 100 pounds; charge, 50 pounds; initial velocity, 2,000 f. s.

The Washington Navy Yard is now one of the busiest places in the country, and to ordnance people one of the greatest interest. The shops in this yard employ 270 men, which is probably more than one-half of the whole number employed in the yard. The machine shops of all the other departments have been brought into use for ordnance work, and when all the men are actively engaged, the scene in them is quite animated. The most interesting part of the work is in shrinking the jackets and hoops on the tube. When this work is in progress, Commander Goodrich and his efficient assistants always have a crowd of interesting spectators, many of whom come from distant points to witness the work. This work of assembling the parts is accomplished by heating the jacket to a temperature sufficient to expand it to a size slightly greater than the tube. The utmost skill is necessary in calculating the shrinkage, so as to make the jacket of just sufficient size to pass over the tube when heated and to fit firmly when it cools. Too great a shrinkage would cause a strain on the metal, while too little would prevent the jacket from fitting closely.

The removal of a jacket from its tube, which was recently made necessary with one of the 8 inch guns, is an interesting piece of work, requiring very skillful manipulation. The gun is so fixed that the molten metal can be poured around the jacket, the heat giving it an expansion sufficient to draw the tube out. Great care is taken to raise the tube from the jacket immediately after being loosened. A short delay would cause the tube to expand proportionately, making it impossible to draw the jacket from it.

The steel tubes, jackets, and hoops for the smaller calibers were all furnished by the Midvale Co. The tubes and jackets are rough turned and bored at the yard, and then returned to the Midvale Co. for oil tempering for the purpose of raising the metal up to the standard. After the tubes and jackets have been tempered, and specimens from them tested and approved, they are again sent to the Navy Yard, where they are fine bored and fine turned, preparatory to assembling with the other parts of the gun, many of which are tempered at the yard. This process consists of immersing the steel at a cherry heat in a bath of oil, and there allowing it to cool. For this purpose there is, at the Navy Yard, a tank sunk in the ground about 17 feet deep, with a diameter of 5 feet, and holding 1,000 gal lons of oil. It is necessary to have the liquid in which the steel is immersed at a low temperature, and to this end the tank is constructed with a 5 inch space around the inner tank, through which water circulates. Sperm oil was at first used, but cotton seed oil is now substituted, as it is much cheaper and answers the purpose equally well. On cooling, the steel is tested to ascertain the tensile strength, elasticity, and extension, and it is often necessary to repeat the process or to anneal it. The annealing process consists in burying the metal in a tank filled with sand, under which a fire is built and banked, and the whole allowed to cool. When the steel is taken out, it possesses increased ductility.

In addition to the construction of these guns, much work has been and is being done at the yard in the way of making machinery tools, etc., necessary to carry on the work of building the guns. Carriages for the guns are also being made. A great lathe is now being constructed for handling the two 10 inch guns. The jackets have been shrunk on these two guns, and when the lathe has been finished they will be pushed to completion as rapidly as possible.—*Army and Navy Jour.*

The Growl of a Pessimist.

The world is growing better every day:
This fact is plain, so hopeful people say.

It may be, but the keen observer sees
That pepper still is largely made of pease.

The pump still aids to swell the milk supply,
And "prime old port" we get from logwood dye.

The bottom of the strawberry box draws near
And nearer to the top each passing year.

The finest apples, cherry checked and round,
Still at the top of appie bar'l's are found.

(Ah, who would dream of beholding such a show,
So many rotten ones were hid below!)

"Pure dairy butter;" much of this, I ween,
Is still composed of oleomargarine.

The world is growing better, people say—
New rogueries are developed every day.

The world is as 't has been since it began:
Man studies still to cheat his fellow man.

—*Boston Courier.*

The Fast Atlantic Steamers.

Some interesting facts are published concerning what are known as the "greyhounds" of the Atlantic. The steamship Etruria, the latest addition to the Cunard line, has made 805 knots in forty-six hours with three-quarters steam. From the Fastnets to Ballycotton Light she steamed at the rate of 19·6 knots per hour, with sixty-three revolutions of the screw per minute. On a six hours' run in the Clyde, with Scotch coal, she reached 67·5 revolutions of the screw, and made 20·233 knots, going and returning between the Pladda and Sanda. This gives a speed of 24 statute miles per hour. The Etruria is a sister ship of the Umbria. She is entirely of steel, 520 feet long by 57 feet 3 inches broad, and 41 feet deep. The following figures relate to nine vessels of the fastest class, all constructed within the last eight years:

Name.	Builder.	Length. ft. in.	Breadth. ft. in.	Depth. ft. in.
Arizona	Elder.	452 2	45 4	35 7
Alaska	Elder.	500 0	50 0	38 0
Servia	Thomson.	515 0	52 1	37 0
City of Rome	Barrow	560 2	52 3	37 0
Oregon	Elder.	500 0	54 0	39 9
Aurania	Thomson.	470 0	57 2	37 2
America	Thomson.	441 8	51 2	36 0
Umbria	Elder.	520 0	57 3	41 0
Etruria	Elder.	520 0	57 3	41 0

Five of these, the Servia, Oregon, Aurania, Umbria, and Etruria, are owned by the Cunard line, and it will be observed that these five have a greater breadth of beam and greater depth than their competitors—an important element in the calculation of comfort and safety. During the seven voyages from May last to January, the Oregon never steamed less than 400 knots per day coming east, nor did she vary more than four hours in the trip. Her quickest passage out and home—the quickest passage on record—was done in 12 days 21 hours 9 minutes, or an average of 18½ knots, or 21·40 statute miles, an hour.

Gold and Silver Ferns.

L. G. Doane says, in *The Microscope:* Upon a slip of glass put a drop of liquid auric chloride or argentic nitrate, with half a grain of metallic zinc in the auric chloride, and copper in the silver. A growth of exquisite gold and silver ferns will grow beneath the eye.

ENGINEERING INVENTIONS.

An automatic lubricator for steam engines has been patented by Mr. Charles Conse, of Belleville, N. J. This invention covers a novel method and construction, including a single valve of needle form, whereby the oil, instead of being allowed to evaporate in the cup, is flushed therefrom by the water of condensation of the steam, the amount of oil being easily regulated, and the arrangement being such that the action of the lubricator can be easily observed.

AGRICULTURAL INVENTIONS.

A plow has been patented by Mr. Daniel M. Barringer, of Bennettsville, S. C. This invention covers a peculiar construction and arrangement of parts so that standards and uprights may be arranged side by side when bedding and ridging land, and plows may be readily adjusted to adapt them for various kinds of work.

A potato digger has been patented by Mr. Walden Eddy, of Greenwich, N. Y. It is intended to work without wheels, a concave plow or scoop being provided with rigid handles and pivoted to the vertical frame to which the team is attached, the construction and combination of parts being such as to promote economy in the manufacture.

A combined sweep, cotton chopper, and dirter has been patented by Mr. Thomas Northen, of Lineville, Ala. This invention covers novel features of construction, whereby plants may be chopped by drawing the chopping hoe forward along the row, or the plants may be left for a stand by swinging the hoe to one side, the operation of the hoe being readily controlled.

MISCELLANEOUS INVENTIONS.

A hitching device has been patented by Mr. James T. Crabb, of Eminence, Ky. Combined with a rod hinged on a fence is a snap hook, held on the free end of the rod in such way as to make a secure fastening, and yet prevent horses from rubbing or slipping their bridles or gnawing on fences or mangers.

An invalid bed has been patented by Mr. Carl Olsen, of Long Island City, N. Y. Rods are attached to the bottom of the bedstead and slotted arms carrying commode and cushion, with which is a shaft having crank arm, so that the entire mechanism may be worked by the patient occupying the bed.

An inner sole for boots or shoes has been patented by Mr. Charles J. Schmid, of Portsmouth, Ohio. The object is to make a more flexible bottom, for which purpose the insole is split from the toe toward the shank, to leave a longitudinal opening, and filling the panel so formed with some flexible material.

A clothes line holder has been patented by Mr. Louis C. Guhl, of Roseland, Ill. Combined with a bracket is a clamping plate hinged to its bottom and a screw pivoted in the free end of the clamping plate, the screw having a locking nut, so clothes lines may be held securely without knotting or tying.

A mouth piece for pipes has been patented by Mr. William Seabrook, of Edisto Island, S. C. This invention provides for a removable mouth piece, covering an inner one in such way that when one inhales the smoke a current of fresh air will also be drawn in from the outside, thus cooling the stem of the pipe.

A turbine water wheel has been patented by Mr. Jacob W. Truax, of Essex Junction, Vt. This invention covers improvements on a turbine wheel patented by the same inventor in 1860, and relates to modifications to give the least resistance possible to the outflowing water to prevent back pressure of the water against the wheel.

A fire escape has been patented by Mr. Silvestre Sampre, of New York city. This invention provides a portable balcony in the form of a folding box, in connection with a chute made in sections to be joined together, with other novel features, the device to be kept in the house, so it can be attached to the window sill when required.

A provision safe has been patented by Mr. Jefferson Odenbaugh, of Wharton, O. It is so constructed that it may be quickly "set up" for use and "knocked down" to pack away in small space for storage or transportation, while in use it will allow free circulation of air over the provisions and protect them from insects.

An oxygen gas attachment for gas burners has been patented by Mr. Charles Beseler, of New York city. Combined with an ordinary Argand burner is an oxygen gas receiver having outlet openings communicating with a space a circular series of openings in such way that oxygen gas may be supplied to an ordinary gas flame for producing a light of great brilliancy.

A cartridge shell holder has been patented by Mr. Sidney S. Stahl, of Connellsville, Pa. This invention provides a holder for attachment on cartridge belts, consisting of a wire bent to adapt it to hold the shell and a spiral spring held on the bottom of the holder, by which the shells can be held securely in place, or easily removed and replaced.

A knife for cutting oil cloth has been patented by Mr. Alfred S. Seaman, of Frackville, Pa. The blade has a cutting hook at the end, its main portion being a straight guide edge, so formed that the handle will allow its being laid upon the article to be cut, and the hand will not rub thereon while the knife is drawn to do the cutting.

A harrow tooth fastener has been patented by Mr. James Miller, of Atwater, Minn. This invention consists of a double clip fastener of peculiar construction for each tooth, whereby the tooth is fastened into the harrow without punching holes in the harrow bars or irons, and the bars of the harrow are held in their proper angling position.

A compound valve has been patented by Mr. George W. Appleby, of Cohoes, N. Y. The plug and body of the valve are each made with two passages, and the outlets are cut off by sliding valves fitted to the plug and operated by levers, making two valves in one, for delivery of two liquids at once, or either alone, without intermixture.

A watch regulator has been patented by Mr. Swen P. Sandmark, of Ishpeming, Mich. This invention covers a special construction of forked frame, cross bar, double headed screw and slide, making a device which is ornamental, and more reliable for fine adjustment than when the movement is given in one direction by a spring.

An apparatus for steaming dyed fabrics has been patented by Mr. Eugene Rau, of Brooklyn, N. Y. Combined with a boiler or steam vessel is a car or frame adapted to pass into the same, the car having rods or bars from which the fabrics may be suspended, the rods having also devices by which they may be revolved from the outside of the boiler.

A dental engine holder has been patented by Mr. Charles H. Gilbert, of Andover, Mass. Combined with a suspended tube adapted to support a bracket is a shaft within the tube, with a pulley, and means for vertically adjusting the shaft, with various other novel features, making an apparatus which can be conveniently operated by any suitable motor.

The walls and ceilings of buildings form the subject of a patent issued to Mr. Lewis A. Mitchell, of Elizabeth, N. J. This invention relates to cement or artificial stone blocks used in the construction of walls and ceilings, and consists in forming the blocks with fastening plates and recesses at the edges, making a wall in which no wood is required.

An attachment for oven doors has been patented by Mr. Isaac A. Abbot, of Denver, Col. Combined with an oven door opening is a frame secured on the door and holding a pane of glass or mica, with a thermometer hinged to the frame inside of the pane, so the inside of the oven may be kept under observation and the temperature will be indicated.

A stocking or sleeve supporter has been patented by Mr. Elias Oppenheimer, of New York city. It is made with a plate having a forwardly projecting inwardly inclined flange upon its curved lower end, and two more slots in its shank, or with other novel features, making an article that is simple in construction and convenient and reliable in use.

A metallic helmet has been patented by Messrs. Charles H. Lindenberg and Edward G. Drake, of Columbus, O. Its crown is composed of a number of concaved triangular sections jointed together at their side edges, so the sections may be shaped rapidly, with machinery that is not very costly, and inferior tin may be used, so the hat can be gotten up very cheaply.

A circular sawing machine has been patented by Mr. Warren Keller, of St. Joseph, Mo. The invention covers such a combination of parts that a circular saw can be easily manipulated by hand, and so be adapted to the needs of carpenters, farmers, and all who have occasion to use a circular saw, but do not have sufficient work to employ horse or steam power.

A reversible hinge has been patented by Mr. Joseph F. Aston, of Watsonville, Cal. Upon the pintle is placed a barrel which has a dovetailed slot formed in it, that reaches nearly to the lower end of the barrel, for holding the reversible leaf of the hinge, the leaf being formed at each edge with a flange to fill the slot of the barrel, so that by reversing the leaf the hinge may be used as a right or left hand hinge.

A combined hame tug and trace buckle has been patented by Mr. Henry B. Robertson, of Havensville, Kan. A plate with buckle frame has a journaled roller, the latter having a tongue and thumbpiece, and there being a latch on the plate adapted to engage the thumbpiece and hold the tongue in position, so the trace is easily adjusted, and is at all times held straight and not liable to rip.

A wheel felly machine has been patented by Mr. William H. Stevens, of Coldwater, Mich. This invention consists in means for sawing off both ends of a felly at once, and means for boring all the holes required in the same felly at one action, and without removing it from the gauge whereon it was sawed; and it may also be adapted to fitting the rims of wheels which are bent in halves.

A pipe thread cutting stock has been patented by Messrs. Amos Trout and Charles H. Ortlip, of Philadelphia, Pa. This invention covers a screw threaded feeding or starting tube connected with the die carrier of the stock, with adjustable and guiding jaws for centering the pipe or article to be threaded, and embraces various novel features of construction and operation.

An indicator lock has been patented by Mr. Horace G. Stripe, of Omaha, Neb. The latch bolt has shoulders and frames carrying numbers or characters, an angle lever with a tooth on one end and its opposite end adjoining the shoulders of the bolt, springs acting on this lever and on the frames, making an improved registering device for a railway or other door lock.

A dumping car has been patented by Mr. Charles Culverson, of Wescosville, Pa. To the truck frame are journaled long cranks with their journals extended and bent outward and upward and connected by rods with levers pivoted to the truck frames, so the car body can be fastened in a horizontal position and can be readily released and dumped, returning to its horizontal position automatically.

A combined punching and flanging machine has been patented by Messrs. Sherman T. Thompson and William B. Richards, of Adams, N. Y. It is an improved tinner's tying machine, combining a sliding punch, spring face plate, and fixed bed for punching the sheets and riveting the burr caused by the punch, doing the work more rapidly and easily than is possible by previous methods.

A window shelf has been patented by Mr. Joseph G. O'Neill, of Nevada City, Cal. It is adapted to be easily adjusted on the inside or outside of a window indifferent positions, having hinged brackets and latches for locking the brackets in place on the shelf parallel with the ends, there being apertured lugs on the standards of the window frame, into which pins are passed which project from the inner ends of the brackets.

A journal bearing has been patented by Mr. Alvis M. Weatherly, of Selma, Ala. This invention covers a journal bearing with a metallic box, a series of oil tubes extending within the box from its exterior, and a composition of asbestos and white lead filling the box between the tubes in such way as to support the required weight without yielding so much as to be impracticable.

A saw has been patented by Mr. Isaac M. Smith, of Palmyra, Ind. This invention covers a novel combination of certain forms of teeth in the same saw blade, whereby the saw is made to operate with increased efficiency and requires less power to work it, and so it will start in straight without any side cutting or scratching, and will continue to make a smooth, even, and uniform cut.

A hose tower and fire escape has been patented by Mr. William M. Ward, of Harbor Grace, Newfoundland. Combined with an upright frame mounted on wheels is a vertically sliding frame adapted to be moved by upright screw spindles, hose nozzles being arranged to swing vertically and laterally on the frame, and connected with conducting pipes of hose extending to the ground, staircases being also arranged in connection with the vertically sliding frame.

An apparatus for training horses to harness has been patented by Mr. Charles F. Shedd, of Fairfield, Neb. This invention consists principally of a harnessing stall and a suitable sweep, the latter adapted to be connected by a rope or cable, so the horse to be trained may be easily taken from the stall to the arms of the sweep, to be hitched and worked, so horses may be broken to work without danger or injury to persons or to the horses themselves.

A cloth pressing machine has been patented by Mr. Robert Patrick, Jr., of Galt, Ontario, Canada. This invention covers a special construction and arrangement of parts in a machine to which the cloth is fed automatically, and pressed between two flat surfaces, the press plates being separated to allow the cloth to be fed forward and forced together to press the cloth automatically, each part of the cloth being subjected to two pressings.

A machine for making axes has been patented by Messrs. Edward Yerkes, of East Douglass, Mass., and Clayton Denn, of Philadelphia, Pa. This invention combines the press for forging, shaping, punching, and cutting off the heads for axes, adzes, hammers, and other like tools, with the ram and dies for shaping the poles and welding on the bits, together with improvements in the contrivances of the poll and bit shaping and welding apparatus.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Information requests on matters of personal rather than general interest, and requests for **Prompt Answers by Letter,** should be accompanied with remittance of $1 to $5, according to the subject, as we cannot be expected to perform such service without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Minerals sent for examination should be distinctly marked or labeled.

(1) **T. A. J. writes: I don't see why so** many have failed in making dynamos according to cut in SUPPLEMENT, No. 161. I have made one three times the size, and it works splendidly. Will run an arc lamp ¼ carbon, or one lamp 20 candle power.

(2) **J. S. asks (1) the longest distance** that an acoustic telephone will work successfully? A. About a mile. Better use fine twisted wire cable than the No. 18 wire. Your telephone ought to work well through a distance of a half a mile on a still day. 2. What to loop the wire up with? A. Use ordinary twine.

(3) **R. S. asks an easy way to bore holes** through plate glass. A. Harden your drill in mercury, taking care to not inhale the fumes, and keep the point of the drill constantly moist with spirits of turpentine.

(4) **L. H.—Momentum is quantity of** motion, or the product of mass or weight and velocity in feet per second, and is denominated foot pounds. This should not be confounded with impact, which is the force transferred by the momentum of a moving body in contact with a body at rest, or under a different velocity.

(5) **D. A. K. asks the difference in the** height of the Pacific Ocean and the Gulf of Mexico, according to the survey of the Panama Canal, and if it is the intention to build locks in the canal. A. At mean low tide there is not much difference in the level of the two oceans at the Isthmus; but owing to the pocket formation of the Bay of Panama, the tide rises 16 feet at the Pacific end of the canal and only 5 feet at the Atlantic end; tide locks will be necessary at both ends.

(6) **W. E. S. R.—A rifled siege gun has** thrown shells a distance of 7 miles, at Charleston. We think the longest range possible now is 8 to 9 miles. A muzzle velocity of 1,600 feet per second gives a range of about 6 miles. Some of the Krupp guns are said to have attained a muzzle velocity of from 2,200 to 2,500 feet per second.

(7) **J. A. D.—It matters very little** whether boilers are unlike in size or set at different levels, as long as they have separate feed valves and check valves, so as to control the water level in each. No connecting water drums should be allowed. Ample

steam connections between boilers are proper, with independent safety valves for each, and a valve for each steam connection that does not interfere with the proper action of the safety valve under any condition of steaming with one or both boilers.

(8) C. H. R.—There is no varnish suitable for bright work that will stand. There are many thousand velocipedes with bright work in use in the vicinity of this city. All are kept clean and bright by wiping and oiling the iron and steel and simply wiping the nickel plate. Vigilance is the price of victory in this as well as other things.

(9) J. B. S. asks: Does steel increase in bulk on being hardened? If so, why? It was found, by bending two bars of steel in the shape of a triangle, both, of the same length, gave the same sound; one was hardened, and its sound became lower; since bending, it has raised its tone half a note. A. The hardening of steel changes its elastic strength and also its length. Your triangle has probably become shorter by hardening.

(10) W. B. writes: If the cables of the Brooklyn Bridge were to expand enough to allow the center of the bridge to fall on a level with both ends, would the roadway sustain a part of its own weight from the sides, before reaching a level? A. The girders and stay rods would probably support themselves if the cables were removed. It is possible they would also hold the cables and whole bridge system besides.

(11) F. H. W.—As mercury expands 0·016 of its bulk for 180° Fah., for 3° Fah. you will require, for a ⅜ inch glass tube, 450 cubic inches of mercury to move a piston 1 inch, with compensation for expansion of glass bulb. The resistance to pressure will be enormous. The diameter of the bulb should be 9½ inches.

(12) J. McD. writes: 1. I have a small boiler made out of 12 feet of 1 inch pipe bent into a coil 6 inches diameter; the steam pipe is ¼ inch diameter, and comes out of the highest part of the coil, but when I turn on the steam into the engine the water comes out too. Will you be kind enough to tell me if I can stop this without using a dome, and how? A. Your boiler of 1 inch pipe cannot be utilized for more than a ⅛ horse power at most. You should have a chamber at top with a separate connection with bottom of coil, so that the water will circulate, and thereby be enabled to liberate the steam. As it is now, the steam generated in the lower part, and possibly the hottest part, cannot reach the top without traversing the whole length of the pipe. It lifts the water with it, hence your trouble. In such a boiler you may carry 100 pounds pressure. 2. Also, what pressure can I safely carry and what size pump would I require to supply boiler? A. A pump ⅜ plunger, 2 inches stroke, single acting, will be ample.

(13) A. K. B. asks: Is it possible to devise an arrangement of weight, rope, and drum sufficiently strong to work the bellows of an organ now blown by a stout boy, in a church where a fall of 30 feet could be obtained? A. Such an arrangement can be made, but the friction will be a large percentage of the labor of winding, probably 50 per cent.

(14) G. R. N. desires to dye California redwood in three colors: 1, a bright red; 2, a dark blue; 3, a light yellow or golden color. A. Red.—Take 1 quart alcohol, 8 ounces Brazil wood, ½ ounce dragon's blood, ½ ounce cochineal, 1 ounce saffron. Steep to full strength, and strain. Blue.—Indigo solution, or a concentrated hot solution of blue vitriol, followed by a dip in a solution of washing soda. Yellow.—Use turmeric dissolved in wood naphtha, or wash over with a concentrated solution of picric acid, and when dry polish the wood.

(15) J. V. D.—For polishing locomotive brass work: If very dirty, use kerosene oil and tripoli, or Bath brick pulverized on a piece of felt or woolen cloth. Then wipe with a clean cotton cloth moistened with engine oil. After the work has once become bright, a little whiting on a cloth is better than the tripoli, as it does not wear the brass so much; but always keep the brass work slightly oiled. Lacquers should be avoided, as they burn on, and make more work than by often wiping down with the whiting and oil.

(16) F. L. G.—We know of no cheap way of making a refrigerator for household purposes without ice. Such a process, if convenient, would be worth a great deal of money. The silver Boehm flute is wonderfully sweet and soft in the hands of an artist, but the question of superiority of an instrument is too much dependent on the performer for any other than the user to give an opinion.

(17) W. H. S. writes: In an article in your paper of several weeks ago, you say that in damp sawdust boxed up spontaneous combustion took place. I have stored ice in a dark entry in the barn. The ice is packed against a stone wall on one side; the other sides are boarded with four inches of space between the ice and boards, which is filled up with green, damp sawdust. I propose to cover the board sides with tar paper. Do you think there is danger of the sawdust taking fire spontaneously? A. We have not heard of ice houses taking fire from spontaneous combustion of the damp sawdust; possibly the temperature is kept down by the ice, possibly an ice house may be safe. On the other hand, we saw, only a few days since, a barrel tumbled into the street, from which smoke was issuing. Upon breaking it open it was found packed with telegraph insulators (glass) in sawdust. The sawdust was damp to the feel, and the sawdust in the central part of the barrel was on fire and well charred. How did it take fire?

(18) T. R. asks what there is in the condensed water from steam radiators to corrode and destroy the pipes and connections through which it escapes. A. There is nothing in the condensed steam but pure water. Hence its affinity for anything that is as easily oxidized as iron. A small quantity of water of condensation moving along the lower side of iron pipes with nearly the velocity of the passing steam soon cuts grooves in the pipe, and particularly at the ends, where screwed into the fittings, the erosion seems to be the greatest. This is a universal trouble with steam and hot water pipes. We know of no help but renewal when required.

(19) W. H. W. asks: 1. In giving lead to the slide valve of a locomotive or other engine, which is the proper place to have the crank—on the exact center or just commencing the stroke? A. Put crank on exact center. 2. How would you get the crank of a locomotive on the exact center? A. Move the locomotive along on a track, for each side separately, until crosshead has reached the end of stroke; or, if wheel center and centers of cylinder are in line, bring the center of crank pin to that line. 3. Please explain how it is that in speaking of railway curves some people express them as so many degrees. I can understand a curve to be of a certain radius, but I cannot understand how it can be expressed by degrees. A. The number of degrees embraced between the radii of the ends of the curve is probably meant, as that is a general expression. Other angles are used in laying out curves, which can only be explained with a diagram. 4. Is not the "safe working strain" for ropes and hawsers given by Haswell in his pocket book about ten times too much for general use? A. The safe working strain as quoted is about six times too much for general use. In Haswell, edition 1884, $cir^2 \times$ tabular unit = safe strain; one-quarter to one-seventh for general use.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

May 19, 1885

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Accordion, F. Gessner.... 318,242
Agricultural implement, combined, J. F. Daves... 318,171
Anchor, S. Baxter.... 318,229
Animal trap, L. N. B. Sorrell.... 318,146
Automatic switch, W. H. McKinley.... 318,011
Axle box, car, R. Hunter.... 318,187
Axle, vehicle, W. E. Jacobs.... 318,118
Baking pan, rectangular, Williams & Richey.... 318,438
Barrel, P. R. Gottstein.... 318,370
Barrel stand, I. G. Pollard.... 318,392
Basket, wire, W. B. Bisbee.... 318,061
Bathing suit, J. J. Pfister.... 318,133
Bearing and bush, S. M. Guss.... 317,993
Bed, J. P. Moore.... 318,282
Bed bottom, adjustable spring, M. N. Lovell.... 318,381
Bed, invalid, C. Olsen.... 318,199
Bed spring, C. R. Davis.... 318,002
Beds, etc., spring frame for, B. Taylor.... 318,219
Bedstead, G. Bull.... 318,351
Bell, elevator alarm, L. W. Pedicord.... 318,202
Belt fastener, J. Essig.... 317,984
Block. See Pulley block.
Blower for boiler furnaces, combined steam and air, W. McClave.... 318,008
Boiler. See Tubular boiler.
Boilers, purifying water for, C. Elliot.... 317,983
Book holder, W. F. Holloway.... 318,253
Boot or shoe inner sole, C. J. Schmid.... 318,209
Boots, making combined knit and felt, S. G. Alexander.... 318,342
Boots or shoes for the buttons, machine for marking the quarters of, A. F. Preston.... 318,390
Bottle stopper, removable internal, E. S. Piper.... 318,290
Box. See Match box. Paper box. Stuffing box.
Box supporter, D. W. Marmon.... 318,384
Bracelet, spring hinged, P. Lettre.... 318,379
Bracket, G. E. Baublits.... 318,343
Brake governor, automatic, G. H. Poor.... 318,021
Brake shoe, J. H. Pitard.... 318,208
Bran packer, O. Anketell.... 318,158
Brick and tile machine, Brewer & Heesen.... 318,347
Brick machines, device for cleaning cut-off wires of, J. N. Tricker.... 318,065
Brick weather-boarding, manufacture of imitation, P. Toglio.... 318,054
Bricks, potteryware, etc., oven or detached kiln for burning, H. Knowles.... 318,266
Bridle and halter, J. Andes.... 318,409
Buckle, J. Wagner.... 318,059
Buckle, M. E. Zeller.... 318,074
Buckle and snap, combined breast strap, J. S. Ginger.... 318,179
Buckle, lever, W. S. Thurlow.... 318,053
Buckles for wearing apparel, guard for, M. Bernstein.... 318,240
Buggy, side bar, D. J. Owen.... 318,017
Burner. See Vapor burner.
Burnishing machine, C. J. Addy.... 318,340
Buttons to garments, machine for attaching, Powell & Nolan.... 318,024
Car brake, Curtner & Genung.... 318,419
Car brake, automatic, J. H. Ames.... 318,076
Car coupling, O. Bangs.... 318,228
Car coupling, Duross & Sutton.... 317,981
Car coupling, S. F. Green.... 318,107
Car coupling, Hampl & Jacobs.... 318,184
Car coupling, S. J. Rhoads.... 318,138
Car coupling, E. Richmond.... 318,140
Car coupling, I. L. Stover.... 318,052
Car coupling, C. H. Zimmerman.... 318,439
Car, dumping, C. Culverson.... 318,170
Car, street, W. D. Mayfield.... 318,274
Car transfer apparatus, R. L. Davis.... 318,360
Caramel cutter, C. Gerber.... 318,101
Card holder, Hannas & Lee.... 318,372
Carding engines, curved guide for the traveling flats of, G. & E. Ashworth.... 318,236
Carding engines, drawing and unburring device for, P. L. Klein.... 318,121
Carrier. See Cash carrier.
Cartridge shell holder, S. S. Stahl.... 318,215
Case. See Clock case. Fishing tackle case. Drawer case.
Cash carrier, C. H. Kelley.... 318,262, 318,263
Cash carrier, Perkins & Kelley.... 318,287
Cash carrier, A. Strickland.... 318,320
Cash carrier apparatus, D. H. Rice.... 318,294
Cash carrying apparatus, D. H. Rice.... 318,032, 318,139
Caster, W. G. Walter.... 318,403
Cheese cutter, W. R. Warden.... 318,333
Child's chair tray, H. A. Paine.... 318,131
Chimney and ventilator top, C. H. Casselmann.... 317,973
Chimney flue, safety, S. W. Schnabel.... 318,301
Chuck, lathe, S. T. Newman.... 318,387
Chuck, rock drill, J. E. Denton.... 318,420
Clamp. See Flooring clamp.
Clamping device, self-adjusting, G. W. Zeigler.... 318,338
Cleaner. See Stable cleaner.
Clock case, Rutherford & Wood.... 318,435
Clothes line holder, L. C. Guhl.... 318,182
Clothing stiffener, adjustable, C. F. Marsh.... 318,272
Clutch, E. Kay.... 318,259
Coasting course, artificial, J. Pusey.... 318,026
Coasting or sledding course, artificial, J. Pusey.... 318,025
Cock for water pipes, self-closing, J. M. Brennan.... 318,083
Collar pad, horse, J. P. Hoffmann.... 318,251
Combing machine and working short cotton delivered therefrom, C. W. Simmons.... 318,046
Corn sheller, S. C. Schofield.... 318,041
Corset, M. R. Bortree.... 318,344
Corset fastening, H. Jetter.... 318,119
Corset shaping apparatus, J. A. House.... 318,256
Corset stretching and finishing machine, J. A. House.... 318,255
Cotton gin, W. Deering.... 318,362
Coupling. See Car coupling. Cultivator coupling. Pipe coupling.
Coupling for straps, etc., P. R. Gottstein.... 318,369
Creamer, cabinet, T. S. Von Devort.... 318,402
Cresting, adjustable, C. Hanika.... 318,108
Crib, J. A. Healey.... 318,111
Crushing mill, centrifugal, F. A. Huntington.... 318,117
Cultivator, J. U. Gillespie.... 318,178
Cultivator, cotton, N. R. H. Burnet.... 318,415
Cultivator coupling, J. Goodnough.... 318,243
Cultivator tooth, G. Carrothers.... 317,971
Cushion. See Pin cushion.
Cut-off device for flexible tubes or hose, A. E. Dart.... 318,091
Cut-off valve gear, automatic, G. Danby.... 317,979
Cutter. See Caramel cutter. Cheese cutter. Fuse cutter.
Cylinders of water of condensation, relieving, G. H. Poor.... 318,022
Damper, stovepipe, J. Grimm.... 317,992
Dental engine holder, C. H. Gilbert.... 318,177
Dental instrument, R. B. Donaldson.... 318,173
Desk and seat, school, G. Hamel.... 318,183
Diaper, L. S. Samuel.... 318,141
Digger. See Post hole digger. Potato digger.
Display rack, B. B. Weidner.... 318,336
Door check, W. H. Teetzel.... 318,323
Door closer, M. P. Ismay.... 318,258
Door hanger, D. Manuel.... 318,125
Drawer case, N. A. Hull.... 318,114
Drawers, overalls, and pantaloons, J. Eisner.... 317,982
Drawing board and draughting appliance, W. G. Stewart.... 318,319
Drier. See Offal drier.
Drill. See Seed drill.
Drill blanks, machine for making, W. E. Taft.... 318,322
Dumbbell, G. L. Bailey.... 318,078
Dust excluder, H. W. Fox.... 318,176
Dyed fabrics, apparatus for steaming, E. Rau.... 318,205
Dyeing apparatus, I. Simonis.... 318,144
Ejector for draining cellars, fluid, G. Haydn.... 318,185
Electric lighting circuits, system of distribution for, J. G. Allen.... 317,960
Electric lighting system, Andrews & Spencer.... 318,157
Electric machine, dynamo, J. S. Du Bois.... 318,094
Electric meter, J. Canderay.... 318,166
Electric way, W. E. Banta.... 318,411
Electricity, device for protection of men from disastrous effects of high tension currents, P. B. Delany.... 318,172
Electrode, carbon battery, H. F. B. Schaefer.... 318,300
Elevating mechanism for buildings, W. B. Hayden.... 318,373
Elevator. See Hay elevator.
End gate, wagon, A. B. Cooper.... 317,977
Engine. See Locomotive engine. Steam engine. Traction engine.
Excavator, B. F. Thomas.... 318,326
Feather renovator, Schach & Stelter.... 318,039
Feed trough, F. L. Buchanan.... 318,349
Feed water heater, J. J. Hoppes.... 318,112
Feed water heater, O. Rothrock.... 318,396
Fence, form and frame for building iron, F. O. Hanson.... 318,427
Fence post, J. W. Davy.... 318,361
Fence post, S. B. Harrod.... 318,428
Fertilizer, L. Haas.... 318,371
Fertilizer distributer, Sheldon & Peacock.... 318,045
File cutting machine, H. J. Gosling.... 318,104
Firearm, breech-loading, D. Kirkwood.... 318,002
Firearm, revolving, J. Boland.... 317,965
Firearm, revolving, D. Smith.... 318,315
Fire escape, W. R. Price.... 318,391
Fire escape, H. Rensch.... 318,293
Fire escape, S. Samper.... 318,299
Fire escape, tower, C. Clarke.... 318,086
Fire kindler, A. W. Hall.... 318,246
Fishing reel, J. Kopf.... 318,190
Fishing tackle case, H. F. Price (r).... 10,508
Flooring clamp, P. J. Abbott.... 317,959
Fluid and detecting waste, registering the flow of, J. C. Ayer.... 318,227
Fluid meter, diaphragm, J. Thomson.... 318,327
Folding stand or table, W. P. Roberts.... 318,298
Foot rest, adjustable and reversible, H. H. Daingerfield.... 317,978
Fork. See Hay fork.
Fork guard and rest, E. E. Wood, Jr.... 318,070
Fruit drying tray, S. E. & J. M. Sprout.... 318,436
Fruit jar top, Repp & Brown.... 318,029
Furnace for burning gaseous fuel, E. A. Uehling.. 318,328
Furniture, household, F. G. C. Peek.... 318,132
Fuse cutter, J. M. Martin.... 318,006
Gauge. See Screw thread gauge. Siding gauge. Water gauge.
Gaiter, button, P. J. Ruetzel.... 318,033
Gardening machine, J. G. Smith.... 318,047
Garment supporter, A. Proudfit.... 318,204
Gas burners, oxygen gas attachment for, C. Beseler.... 318,161
Gas generating apparatus, A. O. Granger.... 318,106
Gas machines and mixers, adjustable apparatus for, J. P. Clifford.... 317,975
Gas, manufacturing, R. B. Stapp.... 318,318
Gate. See End gate. Railway gate.
Gate, Coffin & Ferguson.... 318,355
Gate, W. E. Connelly.... 318,087
Gate, E. E. Hunt.... 318,430
Gate, J. B. May.... 318,386
Glue, Gahler & Pils.... 318,367
Governor, electric marine, B. J. Carroll.... 318,417
Governor, steam, J. Killip.... 318,120
Governors, safety attachment for steam engine, T. R. Pickering.... 318,289
Grader, road, S. Pennock.... 318,019
Grain binder, Hunt & Steward.... 318,257
Grain binder, D. Strunk.... 318,321
Grain by means of air currents, apparatus for drying, J. A. Latcha.... 318,269
Grain, elevating, conveying, purifying, and drying, J. A. Latcha.... 318,377
Grate, W. McClave.... 318,007
Grate, shaking and dumping, P. Miller.... 318,013
Guard. See Fork guard. Keyhole guard.
Gun carriage, F. O. Ekholm.... 318,248, 318,249
Gun, magazine, W. J. Kriz.... 318,268
Hame, H. C. Sargent.... 318,036
Hammer, drop, G. N. Schoenberg.... 318,305
Hand and foot power, combined, W. H. H. Campbell.... 318,353
Handle. See Pump handle. Tool handle.
Hanger. See Door hanger.
Harness and shaft connection, T. J. Lynch.... 318,005
Harness straps, coupling device for, N. W. Hunter.... 318,116
Harrow, W. H. Dungan.... 318,095
Harrow, disk, H. M. Rose.... 318,395
Harrow tooth fastener, J. Miller.... 318,195
Harvester, F. G. Becker.... 317,964
Hat, metallic helmet, Lindenberg & Drake.... 318,192
Hat stand, Matthews & Ireland.... 318,273
Hat sunshade attachment, J. C. Cary.... 317,972
Hatchets, die for making, G. Seisor.... 318,312
Hay elevator and carrier, M. W. Chamberlain.... 318,085
Hay fork, Burnham & Haley.... 318,416
Hay fork, horse, F. E. Kohler.... 318,375
Hay stacker, J. W. & P. M. Hogeland.... 318,429
Hay tedder, F. E. Kohler.... 318,376
Head rest, D. D. Gitt.... 318,368
Heat regulator, C. L. Riker.... 318,393
Heater. See Feed water heater.
Heating apparatus, steam, H. W. Brinckerhoff.... 318,084
Heating apparatus, steam, F. Tudor.... 318,401
Heel protector, I. R. Sanford.... 318,035
Heel nailing machine, F. F. Raymond, 2d.... 318,134
Hinge, gate, M. T. Perkins.... 318,288
Hinge, spring, Colvin & Wolfley.... 318,418
Hitching device, J. T. Crabb.... 318,169
Hoe, scuffle, H. Still.... 318,148
Holder. See Book holder. Card holder. Clothes line holder. Dental engine holder. Pen holder.
Hoopskirt, H. H. Bramhall.... 318,162
Horseshoe, G. F. Messinger.... 318,276
Ice creeper, H. L. Fitch.... 318,365
Ice making apparatus, valve for compressors for, A. T. Ballentine.... 317,963
Indicator. See High pressure indicator.
Indicator lock, H. G. Stripe.... 318,216
Ingot mould, A. Reese.... 318,206
Insulating, manufacture of and preparation of materials to be employed for, J. L. Clark.... 318,233
Intestines, machine for cleaning, C. Nida.... 318,130
Joint. See Rail joint.
Journal and bushing, H. J. White.... 318,065
Journal bearing, A. M. Weatherly.... 318,334
Keg washer, beer, A. Schultz.... 318,306
Kettle or boiler, stewing, H. C. Fish.... 318,365
Keyhole guard and cigar cutter, combined, G. McGovern.... 318,275
Kiln for burning bricks, etc., continuous action, H. Knowles.... 318,265
Kilns, pottery, or coke ovens, etc., construction of, H. Knowles.... 318,264
Knife for cutting oil cloth, A. S. Seaman.... 318,211
Ladder, combined extension and step, P. T. Gates.... 317,987
Lamp, White & Hipwell.... 318,150
Lamp, arc, W. F. Buckley.... 318,350
Lamp burner, E. B. Requa.... 318,030
Lamp chimney, E. B. Requa.... 318,031
Lamp suspension device, C. H. Lyman.... 318,431
Lap ring, O. D. Read.... 318,292
Last, G. A. Reynolds.... 318,137
Lathe tool holding attachment, C. H. Kelley.... 318,261
Lead, apparatus for the manufacture of white, G. L. Irwin.... 318,374
Level, pendulum, A. E. Gardner.... 318,099
Link fitting apparatus, J. H. Stimpson.... 318,217
Lithographic presses, dampening apparatus for, G. P. Fenner.... 318,364
Lock, C. W. Parsons.... 318,388
Locomotive engine, W. C. Shearer.... 418,313
Match box and cigar cutter, combined, M. L. Dixon.... 317,980
Metal barbs, machine for forming and setting flat, A. J. Bates.... 318,079
Meter. See Electric meter. Fluid meter.
Mill. See Windmill.
Mining machine, B. Yoch.... 318,337
Mould. See Ingot mould.
Moulding machine, sand, W. Aiken.... 318,341
Moulding plastic materials, machine for, McHugh & Manchester.... 318,010
Music leaf turner, J. H. Shelton.... 318,308
Music paper for automatic musical instruments, machine for cutting, R. T. Smith.... 318,049
Nail plate feeders, nipper rod for, J. C. Gould.... 318,105
Nail set, G. W. Cannon.... 317,970
Neckwear fastener, A. Burhans.... 317,969
Offal drier, J. Spratt.... 318,050
Oil and utilizing the vapors of the same, apparatus for storing, A. J. Gould.... 318,425
Oil from cotton seed, apparatus for extracting, G. Leder.... 318,191
Oil of low cold test, compound from which can be made a lubricating, R. Pattin.... 318,389
Oil, treatment of cotton seed, J. B. Armstrong.... 318,410
Ordnance, gas check for, J. B. Davis.... 318,093
Ore pulverizer, J. K. Griffin.... 318,181
Ore washer, W. J. Muncey.... 318,014
Ores, etc., reducing, J. K. Griffin.... 318,245
Oven door attachment, I. A. Abbot.... 318,155
Ox shoes, blank for wrought metal, W. K. Miller.. 318,277
Packing, adjustable metallic, F. M. Blake.... 318,082
Packing, piston rod, S. D. Thurston.... 318,400
Pad. See Collar pad.
Pad fastening, sweat and chafe, J. A. Smith.... 318,317
Paddlewheel for propelling vessels, J. S. Allen.... 318,408
Pan. See Baking pan.
Paper bags, making, J. P. Onderdonk.... 318,016
Paper box, A. S. Coffin.... 317,976
Paper box or pail, I. W. Hollett.... 317,997
Papermakers' use, preparation of mineral filling for, Z. C. Warren.... 318,063
Papermaking machine, W. Leishman.... 318,378
Paper, etc., manufacture of fiber for, A. E. Newman.... 318,433
Paper stock drainer, W. Gray.... 318,180
Pavement, manufacture of composite, J. P. Scott.... 318,043
Peach pitter, O. H. P. Brown.... 317,968
Pen holder, E. C. Burrows.... 318,231
Pencil and rule, pocket, Hunt & Bressler.... 318,115
Pencil sharpener, H. White.... 318,404
Pick, miner's, A. T. Moats.... 318,279
Pincushion and button hook holder, W. Goodfellow.... 317,989
Pipe. See Stovepipe.
Pipe coiling machine, Evarts & Greenleaf.... 318,097
Pipe coupling, R. B. Cogan.... 318,356
Pipe coupling, J. A. McCormick.... 318,009
Pipe mouth piece, W. Seabrook.... 318,210
Pipe thread cutting stock, Trout & Ortlip.... 318,222
Pipe wrench, F. Crocker.... 318,089
Plane, adjustable faced, E. Walker.... 318,331
Planter and cultivator, seed, J. H. Bunn.... 317,968

Planter check row attachment, corn, L. Scofield.. 318,042
Planter, potato, F. F. Wolgamuth.... 318,224
Planter, seed, A. E. Scott.... 317,311
Plants, device for watering, D. F. Allis.... 318,075
Plow, J. Austin.... 317,961
Plow, D. M. Barringer.... 318,160
Plow, F. Emerson *et al.*.... 318,096
Plow attachment, L. Even.... 318,241
Plow, sulky, W. G. Danielsen.... 318,358
Plow, wheel, W. Newlin.... 318,283
Post. See Fence post.
Post hole digger, J. E. Davis.... 318,359
Potato digger, W. Eddy.... 318,236
Potato digger, I. W. Hoover.... 318,254
Potato digger, C. F. Hornbeck.... 318,113
Potato digger, G. Wragg.... 318,073
Power. See Hand and foot power.
Press. See Screw press.
Presser roll, Wetherell & Jones.... 318,064
Pressure indicator, high, A. T. Willard.... 318,152
Pressure regulator, fluid, L. J. Griffin.... 317,991
Printing machine, C. Machris.... 318,383
Printing machine sheet delivery mechanism, W. Scott.... 318,143
Protector. See Heel protector. Skirt protector.
Pulley block, M. R. Skinner.... 318,314
Pulley, self-lubricating loose, G. H. Smith.... 318,399
Pump, A. Palmer.... 318,018
Pump, W. E. Williams.... 318,066
Pump handle, A. D. Cook.... 318,235
Punching and flanging machine, combined, Thompson & Richards.... 318,221
Quilting machine, J. B. Hagenbuchle.... 317,995, 317,996
Rack. See Display rack. Towel rack. Wagon rack.
Rail joint, J. Kellow.... 318,180
Rails, machine for straightening, D. Walters.... 318,061
Railway, cable, G. Warburton.... 318,332
Railway frog, H. Elliot.... 318,240
Railway gate, automatic, J. T. Withrow, Jr.... 318,069
Railway gripper, cable, G. B. Bryant.... 317,967
Railway gripping device, cable, B. L. Fetherolf.... 318,008
Railway signal, electric, O. S. Hertzog.... 318,186
Railway signaling apparatus, W. Hadden.... 317,994
Railway switch, E. H. Johnston.... 318,188
Railway switch safety device, A. R. Roberts, 318,297, 318,394
Railway tamper, Bryant & Gilleland.... 318,163
Railway tracks, construction of, T. H. Gibbon.... 317,988
Railway, traction elevated, W. Pyle.... 318,027
Railways, superstructure of elevated, W. F. Sherman.... 318,213
Ratchet apparatus, G. M. Shaw.... 318,212
Reel. See Fishing reel.
Regulator. See Heat regulator. Pressure regulator. Watch regulator.
Rendering tank, V. D. Anderson.... 318,156
Reversible seat, J. R. Ritchie.... 318,296
Ring. See Lap ring.
Rolling beams, Taylor & Skewis.... 318,220
Roof, fire and water proof, M. W. Powell.... 318,023
Roof for hay and grain ricks, portable, W. R. Heath.... 318,248
Roof for portable houses, metal covered, E. Lee.. 318,270
Roofing, cap and anchor for metallic, B. F. Caldwell.... 318,352
Saddle, harness, C. E. Cahoone.... 318,232
Safe bolt works, device for operating, E. W. Fowler.... 317,986
Safe, meat and provision, M. J. Holt.... 311,998
Safe, provision, J. Odenbaugh.... 318,198
Saw, I. M. Smith.... 318,316
Saw sharpening machine, A. C. Eidelbach.... 318,363
Sawing machine, circular, W. Keller.... 318,260
Scissors and pencil holder, combined, C. Bramberg.... 318,346
Screw plate, J. E. Reinecker.... 318,136
Screw press, portable, J. P. Parker.... 318,285
Screw taps, relieving, J. E. Woodbridge.... 318,153
Screw thread gauge, L. S. Starratt.... 318,051
Screw threading tap, J. E. Woodbridge.... 318,071
Seal, car, P. Wagner.... 318,060
Seat fastener, C. C. Forncrook.... 317,985
Seed drill and cultivator, J. G. Smith.... 318,048
Seeds from pulp, machine for separating, L. Ladd.... 318,122
Sewing machine pitman attachment, P. S. Roy.... 318,307
Sewing machines, combined braiding and cording attachment for, D. H. Coles.... 318,337
Shaft, crank, F. Trump.... 318,056
Sheet metal, die for corrugating, C. B. Cooper.... 318,088
Shell crimping implement, A. Bown.... 318,412
Sheller. See Corn sheller.
Shoes, gloves, etc., fastening device for, S. Abecasis.... 318,407
Shutter fastener, J. A. Burr.... 318,414
Shutter worker, R. G. Dudley.... 318,421
Shutter worker, J. Hargraves.... 318,109
Siding gauge, P. V. Moberg.... 318,280
Sifter, ash, F. Chatelanat.... 317,974
Signaling apparatus, W. Neilson.... 318,015
Skate, roller, C. M. Raymond.... 318,291
Skates, anti-friction bearing for roller, E. E. Edgerton.... 318,237
Skirt protector, A. E. Sawyer.... 318,048
Soda, grinding caustic, C. Semper.... 318,044
Spinning and twisting machine, G. M. Whitin.... 318,405
Spinning machines, cap bar support for, W. Mason.... 318,385
Spiral springs, machine for setting, A. O. Walker. 318,330
Spring. See Vehicle spring.
Stable cleaner, L. Zimmerman.... 318,406
Stamp, ore, C. Sholl.... 318,195
Stand. See Barrel stand. Folding stand. Hat stand.
Starch, manufacture of, J. C. Schuman.... 318,308
Starch, preparing and treating, J. C. Schuman.... 318,307
Steam engine, compound, Krieger & Eickershoff.. 318,005
Steam engine condensing apparatus, Alberger & Sault.... 318,225
Steam engine crosshead, S. Greenhalgh.... 318,244
Steam engine crosshead, J. B. Stanwood.... 318,216
Steam engines, automatic lubricator for, C. Couse 318,168
Steam trap, R. B. Helliwell.... 318,249
Steam trap, C. H. Magoon.... 318,271
Steel, deoxidizing molten iron in the manufacture of, N. B. Wittman.... 318,067
Steering machinery, Winter & Williamson.... 318,068
Stereoscope, G. Schneck.... 318,302
Stocking or sleeve supporter, E. Oppenheimer.... 318,301
Stool, folding, A. B. Harnish.... 318,110
Stopper. See Bottle stopper.
Stopper, A. B. Thayer.... 318,325
Stove, W. H. Logan.... 318,290
Stove leg attachment, O. F. Mitchell.... 318,278
Stove or furnace, heating, C. L. Rideway.... 318,295
Stovepipe, D. K. Clark.... 318,167
Stuffing box, A. T. Ballentine.... 317,963
Sugar and glucose, manufacture of grape, J. C. Schuman.... 318,309
Supporter. See Stocking or sleeve supporter.
Suspender end, J. A. Adamson.... 318,329
Sweep, cotton chopper, and dirter, combined, T. Northen.... 318,197
Switch. See Automatic switch.
Table and chair, combined, H. E. Hildebrand.... 318,250
Tank. See Rendering tank.
Telegraph, R. K. Boyle.... 318,345
Telephone attachment, G. R. Tyler.... 318,057
Telephone, magneto, H. E. Waite.... 318,058
Telephone, mechanical, J. C. Rounds.... 318,397
Telephone transmitter, J. P. Freeman.... 318,423, 318,424
Tenoning and boring machine, L. Hutchins.... 317,999
Tent, W. H. Lushbaugh.... 318,382
Thrashing machine extension grate, C. Schafer.... 318,142
Thrashing machine rattle rake, W. & J. Schwartz. 318,310
Tiles, etc., apparatus for setting encaustic, R. Marsh.... 318,126
Tiles, mouthpiece of presses for the manufacture of, C. F. E. Kretzner.... 318,267
Tire rolling machine, J. Munton.... 318,129
Tool handle, H. J. Gosling.... 318,103
Towel rack, P. Stevens.... 318,147
Toy motor, W. N. Weeden.... 318,335
Trace fastening, Espy & Tarbox.... 318,422
Tracks or tramways, trolley for overhead, R. Cartwright.... 318,165
Traction engine, H. B. McMurray.... 318,194
Train signaling, electric, E. T. Gilliland.... 318,102
Trap. See Animal trap. Steam trap.
Trestle socket and clamp, combined, G. W. Zeigler.... 318,154
Trimming, textile, Quint & Mowen.... 318,028
Trough. See Feed trough.
Truck, stove, F. B. Smith.... 318,145
Trunk, G. S. Eggemann.... 318,174
Trunks, chests, etc., stay for, H. Laurence.... 318,123
Truss, A. Pullar.... 318,434
Tube, P. Patterson.... 318,286
Tubular boiler, portable, W. Moran.... 318,128
Type writing machine, H. A. H. Guhl.... 318,426
Type writing machine, index plate for, H. Anderson.... 318,077
Valve, E. A. W. Jefferies.... 318,000
Valve, combined throttle and safety, H. A. Laughlin.... 318,004
Valve, compound, G. W. Appleby.... 318,159
Valve for beer casks, safety, J. C. Schaefer.... 318,040
Valve operating mechanism, slide, J. W. Sargent. 318,037
Valve, stop and waste, P. Harvey.... 318,247
Valve, throttle, L. S. Woodbury.... 318,072
Vapor burner, Dangler & Wackerman.... 318,090
Vapor burner, Schneider & Trenkamp.... 318,303, 318,304
Vapor burner, F. B. Wigle.... 318,151
Vehicle running gear, A. Chalfant.... 518,354
Vehicle spring, metallic, J. Graves.... 317,990
Vehicle, two-wheeled, J. T. McIntyre.... 318,127
Velocipede pedal, A. E. Wallace.... 318,149
Wagon log carrying attachment, J. J. Monroe.... 318,281
Wagon rack, H. Geiger.... 318,100
Wall and ceiling of buildings, L. A. Mitchell.... 318,196
Wall for the support of arches and bricks for the construction of the same, Terrell & Fish.... 318,334
Wardrobe, portable folding, A. J. Holmes.... 318,252
Washer. See Ore washer.
Washing machine, G. Burkhardt.... 318,413
Washing machine, L. Cline.... 318,234
Washing machine, W. J. Reed.... 318,135
Watch movement box, R. B. Lester.... 318,124
Watch regulator, S. P. Sandmark.... 318,218
Watch stem winding device, H. Vent.... 318,329
Water gauge, H. Ochwadt.... 318,284
Water wheel, J. Smith.... 318,214
Water wheel, turbine, J. W. Truax.... 318,223
Weather strip, J. Trachsel *et al.*.... 318,437
Well boring tool, H. C. Safford.... 318,034
Wheel. See Water wheel.
Whip and rein holder, combined, A. E. Batman.... 318,080
Whip holder, Peters & Swartzenburg.... 318,020
Whip stock, Mullen & Noble, Jr.... 318,432
Whip stocks, etc., machine for the manufacture of, Bryant & Ring.... 318,348
Windmill, F. Fanning.... 318,175
Window, W. C. Bullivant.... 318,164
Window shelf, J. G. O'Neill.... 318,200
Wire barbing machine, O. O. Kittleson.... 318,002
Wire, drawing, Warren & Ladd.... 318,062
Wire stretcher, J. M. Merritt.... 318,012
Wrench. See Pipe wrench.

DESIGNS.

Badge, W. Thegen.... 16,099
Brush handles, ornamentation of, C. H. Thurber.. 16,100
Carpet, T. J. Stearns.... 16,098
Cloth, enameled, U. McClinchie.... 16,096
Fringe heading, E. Memleb.... 16,097
Gimp, J. C. Graham.... 16,091, 16,092
Lamp chimney heater, A. Fraser.... 16,090
Pipestem, F. R. Kaldenberg.... 16,095
Rug, R. P. Hemming.... 16,094
Sign, L. S. Grout.... 16,093

TRADE MARKS.

Baking powder, W. Condell.... 12,253
Braid, silk, C. E. Bentley.... 12,241
Crackers, W. G. Wilson.... 12,260
Dentifrice, Van Antwerp & Co.... 12,250
Dress shields, Canfield Rubber Company.... 12,244
Incubators and brooders, M. H. Strong.... 12,249
Lard, W. J. Wilcox Company.... 12,251
Medicine, cough, E. M. Evans.... 12,245
Medicine for diseases of the throat and lungs, H. Button.... 12,242
Nerve tonic, J. S. Pemberton.... 12,257
Oil and axle grease, lubricating, Meriam & Morgan Paraffine Company.... 12,256
Paints, J. Lucas.... 12,246, 12,247
Paper hangings, wall and ceiling, F. Beck & Co.... 12,240
Petroleum, refined, Chester Oil Company.... 12,252
Pianos, Whitney & Currier.... 12,259
Sewing machines and attachments, Domestic Sewing Machine Company.... 12,254
Shoe and leather dressing and blacking, Button & Ottley.... 12,243
Soaps, family, N. K. Fairbank & Co.... 12,255
Tonic and blood purifier, O. I. C. Co.... 12,248
Woolens for overcoatings, E. T. Steel & Co.... 12,258

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